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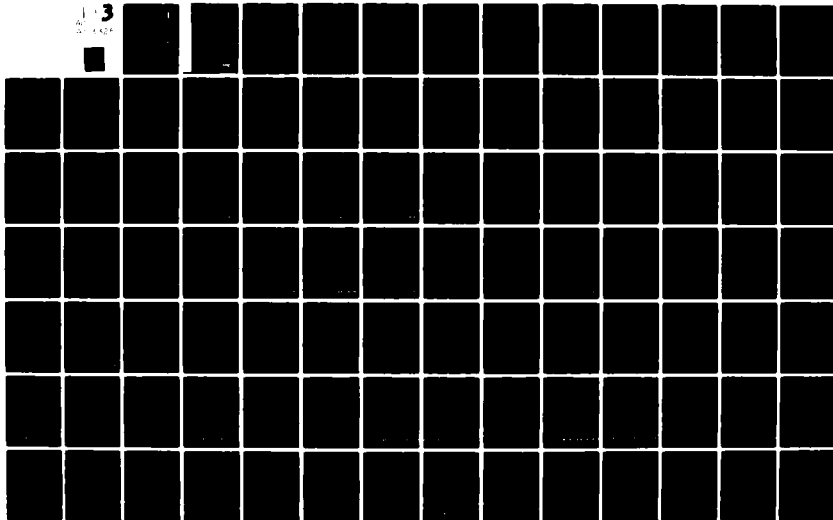
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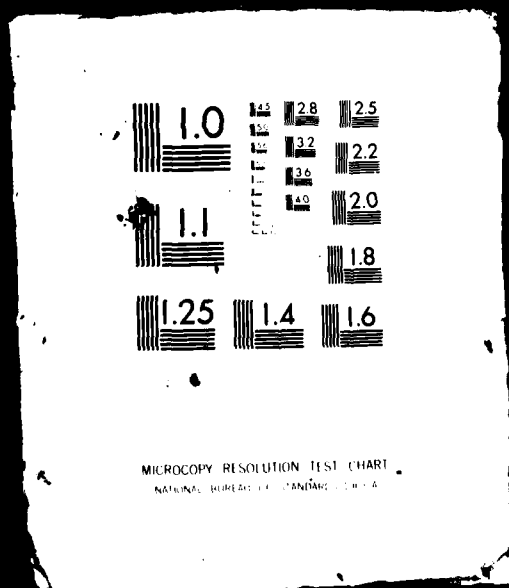
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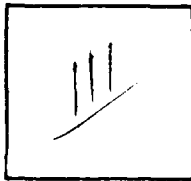
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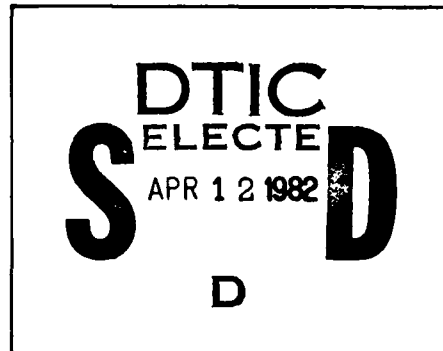
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**MX SITING INVESTIGATION
GEOTECHNICAL EVALUATION**

AD A113325

**VOLUME III
NEVADA-UTAH
VERIFICATION STUDIES, FY 79
GEOTECHNICAL DATA,
SNAKE EAST CDP, UTAH**

**PREPARED FOR
SPACE AND MISSILE SYSTEMS ORGANIZATION (SAMSO)
NORTON AIR FORCE BASE, CALIFORNIA**

FUGRO
NATIONAL, INC.
Consulting Engineers and Geologists

MX SITING INVESTIGATION
GEOTECHNICAL EVALUATION
VOLUME III, NEVADA-UTAH
VERIFICATION STUDIES, FY 79
GEOTECHNICAL DATA
SNAKE EAST CDP, UTAH

Prepared for:

U. S. Department of the Air Force
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24 August 1979

VOLUME III
GEOTECHNICAL DATA, SNAKE EAST CDP

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The objectives of this report are to verify suitable area for MX system & provide preliminary physical & engineering characteristics of the soils. Recommended engineering data consisting of borehole logs, cone penetration test, shear vane test, etc. are presented. The data are used to determine the suitability of the area for MX system.		

FOREWORD

This report was prepared for the Department of the Air Force, Space and Missile Systems Organization (SAMSO), in compliance with Contract No. F04704-78-C-0027, CDRL Item 005A2. It presents geological, geophysical, and geotechnical data and evaluates the suitability of portions of Nevada and Utah for siting the MX Land Mobile Advanced ICBM System.

This report is the first of several Verification reports which will be prepared. The objectives are to verify sufficient suitable area for deployment of the MX System and to provide preliminary physical and engineering characteristics of the soils. The Verification Studies are the final phase of a site-selection process which was begun in 1977. Previous studies have been termed Screening, Characterization, and Ranking. In preparing this report, it has been assumed that the reader is familiar with these previous studies.

Results of the FY 79 Verification studies are contained in 11 volumes as follows:

Geotechnical Results

Volume 1A - Sections 1.0, 2.0, and 3.0 contain Introduction, Results and Conclusions, and Recommendations for Future Studies. Sections 4.0 through 6.0 contain summary geotechnical data for Whirlwind, Snake East, and Hamlin CDP's.

Volume 1B - Sections 7.0 through 10.0 contain summary geotechnical data for White River North, Garden-Coal, Reveille-Railroad and Big Smoky CDP's.

Geotechnical Data Volumes

- Volume II - Whirlwind CDP
- * Volume III - Snake East CDP
- Volume IV - Hamlin CDP
- Volume V - White River North CDP
- Volume VI - Garden-Coal CDP
- Volume VII - Reveille-Railroad CDP
- Volume VIII - Big Smoky CDP
- Volume IX - Dry Lake CDP
- Volume X - Ralston CDP

* This volume is presented herein.

SECTION 1.0
GEOLOGIC STATION DATA

EXPLANATIONS OF GEOLOGIC STATION DATA

Geologic stations were established at selected locations throughout the CDP at which detailed descriptions of surficial basin-fill deposits or rock were recorded. Locations of all geologic stations are shown in Drawing 1, Activity Location Map. All data taken on surficial basin-fill units at these stations are listed in Table 1-1 and an explanation of the column headings in the table is given below. At stations where rock descriptions were made, only geologic unit designations are listed. A general explanation of all geologic unit symbols used in Verification Studies is included at the end of this section.

Column Heading
Table 1-1

Explanation

Station Number	Geologic stations are numbered sequentially. Where more than one geologic field team worked in a CDP, stations made by each team are differentiated with a letter (A, B, or C) following the station number.
Geologic Unit	Generic geologic unit only, i.e. the grain-size designation (f, s, g, c) is omitted from surficial basin-fill units. The letter B in the unit designation indicates a buried deposit not exposed at the surface.
MPS MM	Average maximum particle size in millimeters.
Grain Size (%B, %C, %G, %S, %F)	Estimated particle size distribution using the Unified Soil Classification System. Percentages of boulders (%B) and cobbles (%C) are based on the entire deposit, whereas percentages of gravel (%G), sand (%S) and fines (%F) are taken only on the fraction composed of particles less than 3 inches (76 mm) in diameter.
USCS	Soil class according to the Unified Soil Classification System.

- Munsell Color Soil color based on Munsell Soil Color Chart.
- Source Rock Types(s) Rock types of coarse clasts listed in order of abundance.
- * Physical Properties Data listed in columns 6 through 15 address specific soil properties. These are listed below in parentheses following the column heading number and are also listed at the bottom of Table 1-1. Data are coded with each numerical entry referring to a specific soil condition as listed below.
- 6 (Grain Shape) 1) Angular, 2) Subangular, 3) Subrounded, 4) Rounded, 5) Well rounded
- 7 (Moisture Content) 1) Dry, 2) Moist, 3) Wet
- 8 (Plasticity of Fines) 1) None, 2) Low, 3) Medium, 4) High
- 9 (Consistency) Coarse grained: 1) Very Loose, 2) Loose, 3) Medium Dense, 4) Dense, 5) Very Dense,
Fine grained: 1) Soft, 2) Firm, 3) Stiff, 4) Hard
- 10 (Structure) 1) Stratified Tabular, 2) Stratified Other (lensed, cross bedded, discontinuous beds), 3) Nonstratified
- 11 (Cementation Induration) 1) None, 2) Weak, 3) Moderate, 4) Strong
- 12 (Depth to Cemented Layers) Depth to layer (in centimeters) exhibiting cementation induration described in Column 11 (above)
- 13 (Weathering of clasts) 1) Fresh, 2) Slight, 3) Moderate, 4) Very
- 14 (Soil Profile Development) 1) None (A-C profile), 2) Poor (incipient B-horizon), 3) Well (prominant B-horizon)
- 15 (Caliche Development) 1) Stage I, 2) Stage II, 3) Stage III, 4) Stage IV, 5) None

Drainage

DP (M)

Average depth of drainages (in meters)

WD (M)

Average width of drainages (in meters)

Slope (%)

Average slope of ground surface (in percent grade)

Sample

Number of samples taken

GENERALIZED GEOLOGIC UNITSExplanation

Surficial Basin-fill Units

- A1 Younger Fluvial Deposits - Major modern stream channel and flood-plain deposits.
- A2 Older Fluvial Deposits - Older incised stream channel and flood-plain deposits in elevated terraces bordering major modern drainages.
- A3 Eolian Deposits - Wind-blown deposits of sand occurring as either thin sheets (A3s) or dunes (A3d).
- A4 Playa and Lacustrine Deposits - Deposits occurring in modern, active playas (A4) or in either inactive playas or older lake beds and abandoned shorelines associated with extinct lakes (A4o).
- A5 Alluvial Fan Deposits - Alluvial deposits consisting of debris flow and water-laid alluvium near mountain fronts, grading into predominantly water-laid alluvium deposited in shifting distributary channels near the basin center. Younger (A5y), intermediate (A5i), and older (A5o) alluvial fans are differentiated by surface soil development, terrain conditions, and present depositional/erosional environment.

Grain sizes of these deposits (except A3 deposits, which are exclusively sandy) are indicated by a single letter (f, s, g, or c) following the geologic unit symbol. These letters indicate the predominant grain size and range of soil types according to the Unified Soil Classification System:

- f - fine-grained (ML, CL, MH, CH)
- s - sands (SP, SW, SM, SC)
- g - gravels (GP, GW, GM, GC)
- c - coarse grained with greater than 30 percent boulders and cobbles (generally GP, GW, GM, GC)

ROCK UNITS

- I Igneous (undifferentiated). Rocks formed by solidification of a molten or partially molten mass.
 - I1 Intrusive - Plutonic rocks formed by solidification of molten material beneath the surface (e.g., granite, granodiorite, diorite, gabbro).
 - I2 Extrusive (intermediate and acidic) - Volcanic rocks of intermediate and acidic composition formed by solidification of molten material at or near the surface, (e.g., rhyolite, latite, dacite, andesite).
 - I3 Extrusive (basic) - Volcanic rocks of basic composition, generally formed by solidification of molten materials at or near the surface (e.g., basalt).
 - I4 Extrusive (pyroclastic) - Rocks formed by accumulation of volcanic ejecta (e.g., ash, tuff, welded tuff, agglomerate).
- S Sedimentary (undifferentiated) - Rocks formed by accumulation of clastic solids, organic solids and/or chemically precipitated minerals.
 - S1 Arenaceous and/or Siliceous Rocks - Composed of sand size particles (e.g., sandstone, orthoquartzite) or of cryptocrystalline silica (e.g., opal, chert).
 - S2 Carbonate Rocks - Composed predominantly of calcium carbonate detritus or chemical precipitates (e.g., limestone, dolomite, chalk).
 - S3 Argillaceous Rocks - Composed of clay and silt-sized particles (e.g., siltstone, shale, claystone).
 - S4 Evaporite Rocks - Precipitated from solution as a result of evaporation (e.g., halite, gypsum, anhydrite, sylvite).
 - S5 Coarse Clastic Rocks - Composed of gravel sized or larger clasts (e.g., conglomerate, breccia).
- M Metamorphic (undifferentiated) - Rocks formed through recrystallization in the solid state of preexisting rocks by heat and pressure (e.g., gneiss, schist, hornfels, metaquartzite).

SOIL DESCRIPTION										TERRAIN									
STATION NUMBER	GEOLOGIC UNIT	HPS MM	X2	X3	X4	X5	USCS	MUNSELL COLOR	SCORPEL ROCK TYPE(S)	*PHYSICAL PROPERTIES									
										6	7	8	9	10	11	12	13	14	15
NSEG01A	A40	010	00	00	01	055	C45	SM-SC	10.0YR5/6	2	1	2	3	3	1	2	1	1	1
NSEG01A	A40	010	25	15	07	055	C45	SM-SC	10.0YR5/6	2	1	3	3	3	1	2	1	1	1
NSEG02A	A40	030	00	01	75	025	C00	GP	10.0YR6/4	2	1	1	3	3	1	2	2	2	2
NSEG03A	A40	055	00	01	50	045	C05	GP-SV	10.0YR6/4	2	1	1	3	3	2	020	2	2	1
NSEG04A	A51	110	00	02	10	040	C10	SP-SV	10.0YR6/4	2	1	1	3	3	2	021	1	1	2
NSEG05A	A51	060	00	00	30	065	C05	SP-SV	10.0YR6/4	3	1	1	3	3	1	2	1	1	1
NSEG06A	A40	040	00	01	10	075	C15	SM	10.0YR7/4	3	1	2	3	3	2	035	2	2	2
NSEG07A	A40	060	00	01	75	025	C00	GP	10.0YR6/4	3	1	1	1	2	1	2	1	5	5
NSEG08A	A40	050	00	00	05	C00	C15	SM	10.0YR6/4	4	1	2	4	3	1	2	1	5	5
NSEG09A	A30	00	00	00	100	000	SP	10.0YR6/4	3	1	1	3	3	1	1	1	5	5	5
NSEG10A	A4	00	00	00	001	170	CL	10.0YR6/3	3	2	3	3	3	1	1	1	5	5	5
NSEG11A	A40	040	00	01	60	040	C01	GP	10.0YR6/4	3	1	1	2	2	1	2	1	5	5
NSEG12A	A40	010	00	00	01	100	C01	GP	10.0YR6/4	3	1	1	3	3	1	1	1	5	5
NSEG13A	A40	00	00	00	100	001	SP	10.0YR6/4	3	1	1	2	3	1	1	1	5	5	5
NSEG14A	A4	00	00	00	000	100	CL	10.0YR6/3	1	3	3	3	3	1	1	1	5	5	5
NSEG15A	A4	13																	
NSEG16A	A40	160	00	05	70	030	C01	GP	10.0YR6/4	3	1	1	2	2	1	2	1	5	5
NSEG17A	A40	060	00	01	25	C55	C20	SM	10.0YR6/4	3	1	2	3	3	2	020	2	2	2
NSEG18A	A51	070	00	05	25	C60	C15	SM	10.0YR6/4	2	1	1	3	3	2	020	2	1	1
NSEG19A	A51	040	00	00	10	070	C20	SM	10.0YR6/4	2	1	2	2	3	1	2	1	5	5
NSEG20A	A51	100	01	03	45	045	C10	SM-SV	10.0YR6/4	2	1	1	3	3	2	015	2	2	2
NSEG21A	A40	00	00	01	015	C15	SM	10.0YR6/4	3	1	1	4	3	2	044	2	2	1	1
NSEG22A	A40	090	00	01	010	000	GP	10.0YR6/4	4	1	1	2	2	1	2	1	5	5	5
NSEG23A	A51	050	00	01	45	C40	C15	SM-SV	10.0YR6/4	2	1	1	4	2	3	010	2	1	2
NSEG24A	A51	050	00	01	20	060	C20	SM	07.5YR6/4	2	1	2	3	3	2	020	2	2	1
NSEG25A	A40	00	00	00	000	130	CL	10.0YR6/4	3	1	2	3	3	2	020	2	2	1	1
NSEG26A	A5Y	050	00	01	05	045	C10	SM-SV	10.0YR6/4	1	1	2	2	2	1	2	1	5	5
NSEG27A	A51	110	00	05	55	030	C10	GP-SV	10.0YR6/4	2	1	2	2	2	1	035	2	3	1
NSEG28A	A5Y	030	00	00	01	C79	C20	SC-SV	15.0YR6/4	2	1	3	3	3	2	025	2	1	1
NSEG29A	A40	00	00	00	001	100	CL	10.0YR6/4	2	2	3	2	3	1	1	1	5	5	5
NSEG30A	A51	055	00	00	15	065	C20	GP	10.0YR6/4	2	1	2	3	3	2	024	2	1	2
NSEG31A	A51	070	01	05	40	C45	C15	SM	10.0YR6/4	2	1	1	3	3	1	2	1	5	5
NSEG32A	A5Y	100	00	10	05	C40	C15	SM	10.0YR6/4	1	1	2	3	3	2	020	2	1	2
NSEG33A	A51	200	01	05	35	055	C10	SM-SV	10.0YR6/4	2	1	1	3	3	2	2	1	5	5
NSEG34A	A51	070	00	01	20	C60	C20	SM	10.0YR6/4	2	1	2	4	3	3	025	2	2	3
NSEG35A	A40	040	00	01	65	C35	C00	GP	10.0YR6/4	4	1	1	2	2	2	022	2	1	2
NSEG36A	A51	060	00	01	20	065	C15	GP	07.5YR6/4	2	2	1	2	2	1	2	2	5	5
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NSEG38A	A51	025	00	01	25	C55	C20	SM-SV	10.0YR6/4	3	2	3	3	3	2	020	2	1	2
NSEG39A	A51	045	00	01	30	065	C05	SM-SV	07.5YR6/4	3	1	1	2	3	1	2	1	5	5
NSEG40A	A5Y	045	00	00	10	C40	C10	SM-SV	10.0YR6/4	2	1	1	2	3	1	2	1	5	5
NSEG41A	A5Y	050	00	00	35	C50	C15	SM	07.5YR6/4	3	1	1	2	3	1	2	1	5	5
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*PHYSICAL PROPERTIES :
 6 - GRAIN SHAPE
 7 - MOISTURE CONTENT
 8 - PLASTICITY INDEX
 9 - CONSISTENCY
 10 - STRUCTURE
 11 - CEMENTATION-INDICATOR
 12 - DEPTH TO CEMENTED LAYER(S)
 13 - WEATHERING OF CLASTS
 14 - SOIL PROFILE DEVELOPMENT
 15 - CALICHE DEVELOPMENT

GEOLOGIC STATION DATA
 VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMS0

TABLE
 1-1

FUGRO NATIONAL

SECTION 2.0
GROUND-WATER DATA

EXPLANATIONS OF GROUND-WATER DATA

Existing ground-water data were collected from all available sources. These data were updated where possible from measurements taken during Fugro field operations, and all data are shown on Table 2-1. Locations of water wells and boreholes in which water-level measurements were available are shown in Drawing 1. Well numbers listed in Column 1 (Table 2-1) refer to well locations in Drawing 1. Actual well numbers giving location according to the Bureau of Land Management Land Survey System are shown in Column 2.

Water levels generally refer to the static ground-water table in the unconfined basin-fill aquifer. Perched conditions or levels in artesian aquifers are noted where known.

WELL NO.	WELL LOCATION NUMBER*	ELEVATION OF GROUND SURFACE - FEET (METERS) ABOVE M.S.L.	DEPTH OF WELL - FEET (METERS)	WATER LEVEL			REFERENCES**/REMARKS
				DEPTH BELOW GROUND SURFACE - FEET (METERS)	DATE MEASURED	ELEVATION - FEET (METERS) ABOVE M.S.L.	
W1	12S/17W-34add	4485 (1367)	175 (53)	80 (24)	1911	4405 (1343)	1
W2	12S/17W-34dba	4450 (1356)	175 (53)	120 (37)	1946	4330 (1320)	4
W3	13S/16W-6CC	4660 (1420)	252 (77)	210 (64)	-	4450 (1356)	1
W4	13S/16W-6CCC	4650 (1417)	252 (77)	100 (31)	1962	4550 (1387)	4
W5	13S/18W-35C	4760 (1451)	140 (43)	Flowing	1949	4765 (1452)	1
W6	14S/18W-3ddc	4739 (1444)	120 (37)	Flowing	1949	4745 (1446)	1
W7	15S/18W-11cdb	5160 (1573)	485 (148)	Dry	1962	-	4
W8	15S/18W-17acc	4755 (1449)	72 (22)	35 (11)	1953	4720 (1439)	4
W9	16S/18W-3bac	4978 (1517)	100 (31)	37 (11)	1958	4941 (1506)	4
W10	16S/18W-16dad	4823 (1470)	-	Flowing	1964	4823 (1470)	1
W11	16S/18W-22a	4850 (1478)	-	Flowing	1911	1850 (1478)	2
W12	16S/18W-22cab	4810 (1466)	-	Flowing	1964	4810 (1466)	1
W13	16S/18W-27a	4839 (1475)	-	Flowing	1911	4839 (1475)	2
W14	18S/18W-1b	5060 (1542)	-	100-200 (31-62)	-	4960-4860 (1512-1481)	2
W15	18S/18W-8a	4853 (1479)	-	Flowing	-	4853 (1479)	1,2
W16	18S/18W-16b	4875 (1486)	-	Flowing	-	4875 (1436)	2
W17	19S/18W-6a	5000 (1524)	-	50-150 (15-46)	-	4950-4850 (1509-1478)	2

* Salt Lake Baseline and Meridian

** References:

1. Hood and Rush (1966)
2. Snyder (1963)
3. Utah State Department of Natural Resources (1978)
4. Utah State Engineers Office (1979)

NOTE: All wells tap unconfined alluvial aquifers except where noted. Where published data are lacking or inaccurate, ground surface elevations are taken from topographic maps.

GROUND-WATER DATA
VERIFICATION SITE
SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

TABLE
2-1
1 OF 3

FUGRO NATIONAL, INC.

WELL NO.	WELL LOCATION NUMBER*	ELEVATION OF GROUND SURFACE - FEET (METERS) ABOVE M.S.L.	DEPTH OF WELL - FEET (METERS)	WATER LEVEL			REFERENCES**/REMARKS
				DEPTH BELOW GROUND SURFACE - FEET (METERS)	DATE MEASURED	ELEVATION - FEET (METERS) ABOVE M.S.L.	
W18	19S/19W-14acd	4923 (1500)	177 (54)	11 (4)	1961	4912 (1497)	4
W19	19S/19W-14dcc	4928 (1502)	59 (18)	59 (18)	1966	-	4
W20	19S/19W-14dcd	4928 (1502)	65 (20)	3 (1)	1957	4925 (1501)	4
W21	19S/19W-23bdc	4935 (1504)	110 (34)	13 (4)	1965	4922 (1500)	4
W22	19S/19W-26aba	4948 (1508)	-	17 (5)	1978	4931 (1503)	3
W23	19S/19W-26acd	4947 (1508)	112 (34)	112 (34)	1960	-	1
W24	19S/19W-26bdd	4947 (1508)	100 (31)	12 (4)	1977	4935 (1504)	3
W25	19S/19W-34acd	4968 (1514)	98 (30)	15 (5)	1964	4953 (1510)	4
W26	19S/19W-34adb	4958 (1511)	110 (34)	8 (2)	1960	4950 (1509)	4
W27	19S/19W-34dac	4960 (1512)	82 (25)	6 (2)	1960	4954 (1510)	4
W28	19S/19W-35bdd	4960 (1512)	45 (14)	9 (3)	1955	4951 (1509)	4
W29	19S/19W-35dcd	4975 (1516)	-	11 (3)	1965	4964 (1513)	1
W30	20S/17W-9C	5490 (1673)	760 (232)	600 (183)	-	4890 (1490)	1
W31	20S/19W-1b	4990 (1521)	375 (114)	0	-	4990 (1521)	2
W32	20S/19W-16cc	4985 (1519)	-	12 (4)	1951	4973 (1516)	1
W33	20S/19W-15cba	5010 (1527)	60 (18)	18 (5)	1960	4992 (1522)	4
W34	20S/19W-16bdc	5025 (1532)	40 (12)	15 (5)	1942	5010 (1527)	1

* Salt Lake Baseline and Meridian

** References:

1. Hood and Rush (1966)
2. Snyder (1963)
3. Utah State Department of Natural Resources (1978)
4. Utah State Engineers Office (1979)

GROUND-WATER DATA
VERIFICATION SITE
SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

TABLE
2-1
2 OF 3

NOTE: All wells tap unconfined alluvial aquifers except where noted. Where published data are lacking or inaccurate, ground surface elevations are taken from topographic maps.

FUGRO NATIONAL, INC.

WELL NO.	WELL LOCATION NUMBER*	ELEVATION OF GROUND SURFACE - FEET (METERS) ABOVE M.S.L.	DEPTH OF WELL - FEET (METERS)	WATER LEVEL			REFERENCES**/REMARKS
				DEPTH BELOW GROUND SURFACE - FEET (METERS)	DATE MEASURED	ELEVATION - FEET (METERS) ABOVE M.S.L.	
W35	20S/19W-21acc	5030 (1533)	-	32 (10)	1978	4998 (1523)	3
W36	20S/19W-21b	5020 (1530)	-	32 (10)	1978	4988 (1520)	2
W37	20S/19W-22bcc	5025 (1532)	64 (20)	28 (9)	1975	4997 (1523)	4
W38	21S/17W-8dcc	5070 (1545)	316 (96)	225 (69)	1935	4845 (1477)	1
W39	21S/18W-10cdd	5035 (1535)	66 (20)	65 (20)	-	4970 (1515)	1
W40	21S/18W-12ccd	5050 (1539)	205 (62)	105 (32)	1968	4945 (1507)	1
W41	21S/18W-17ad	5040 (1536)	166 (51)	52 (16)	1958	4988 (1520)	1
W42	21S/19W-14	5080 (1548)	-	50-100 (15-31)	-	5030-4980 (1533-1518)	2
W43	21S/19W-31dcc	5220 (1591)	175 (53)	24 (7)	-	5196 (1584)	1
W44	22S/16W-7ccc	5250 (1600)	550 (168)	D	1935	-	1
W45	22S/16W-8	5390 (1643)	-	D	-	-	2
W46	22S/16W-19b	5305 (1617)	680 (207)	D	-	-	2
W47	22S/16W-20	5340 (1628)	100 (31)	D	-	-	1
W48	24S/18W-20bcc	5777 (1761)	360 (110)	D	1950	-	1
W49	24S/18W-27a	5870 (1789)	500 (152)	D	-	-	2
W50	24S/18W-29b	5850 (1783)	936 (285)	D	-	-	2
W51	13N/70E19b	5160 (1573)	82 (25)	25 (8)	1947	5125 (1562)	1

* Salt Lake Baseline and Meridian

** References:

1. Hood and Rush (1966)
2. Snyder (1963)
3. Utah State Department of Natural Resources (1978)
4. Utah State Engineers Office (1979)

NOTE: All wells tap unconfined alluvial aquifers except where noted. Where published data are lacking or inaccurate, ground surface elevations are taken from topographic maps.

GROUND-WATER DATA
VERIFICATION SITE
SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

TABLE
2-1
3 OF 3

FUGRO NATIONAL, INC.

SECTION 3.0
SEISMIC REFRACTION DATA

EXPLANATIONS OF SEISMIC REFRACTION DATA

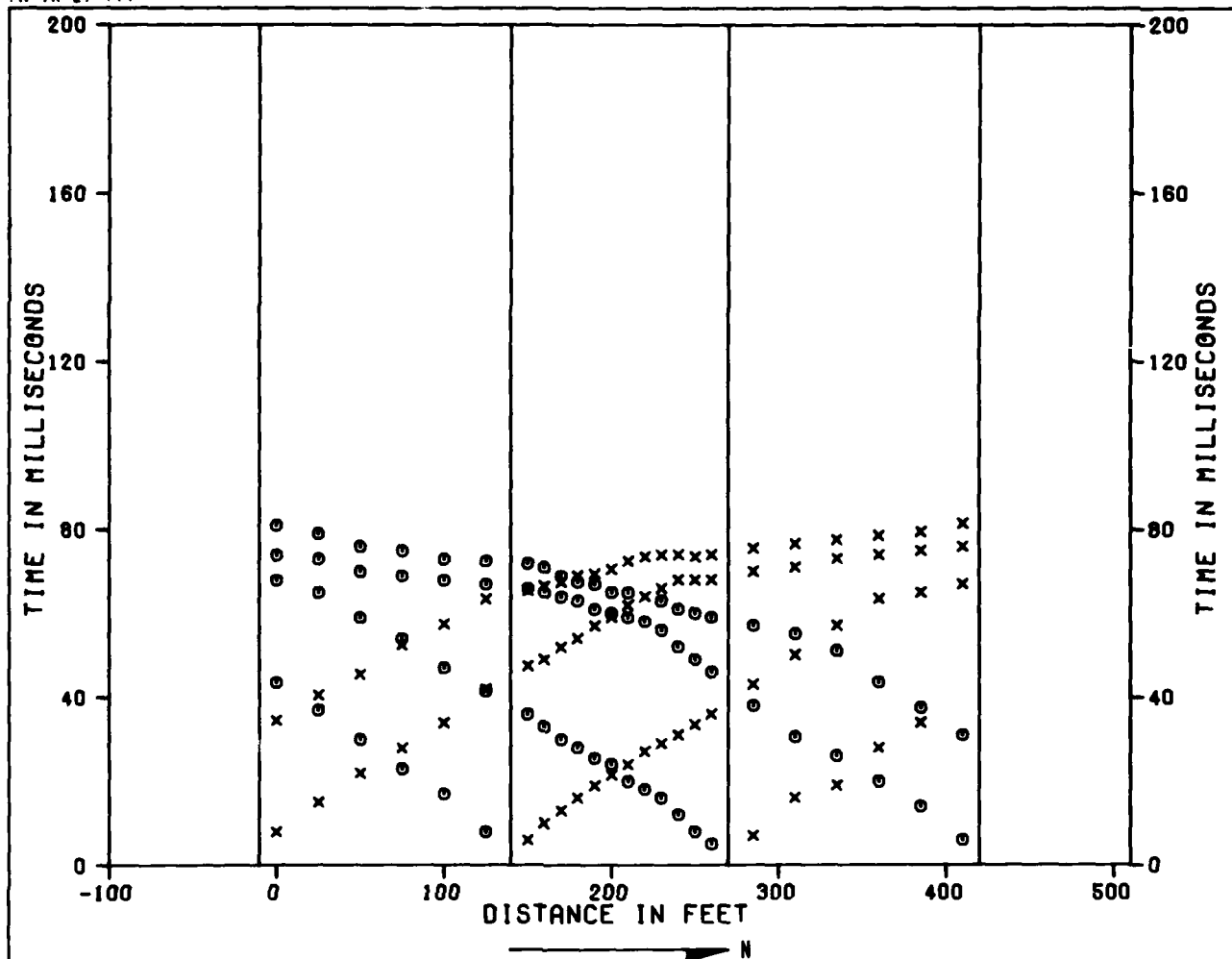
Each figure shows seismic wave travel times plotted versus surface distance between the energy source (shot) and the detector (geophone) for a single seismic line. Distances are measured along the line from geophone number 1 which is designated as zero distance. Distances to the right (on the paper) of geophone 1 are positive. The direction arrow gives the approximate direction of the geophone array from geophone 1 to geophone 24.

Travel Time Versus Distance Graph (Upper Half of Figure)

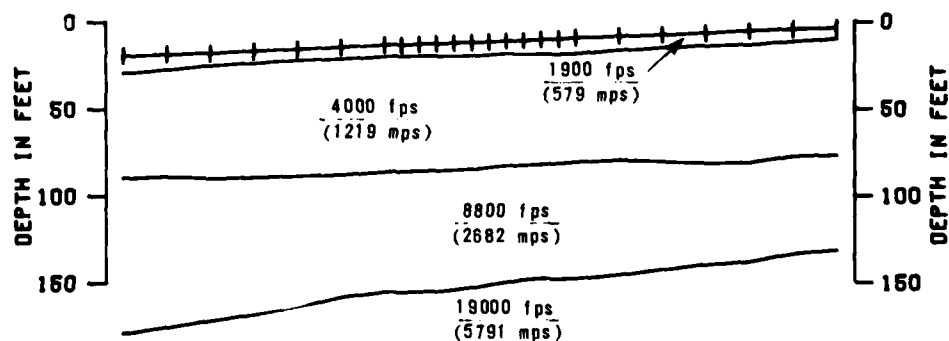
This is a travel time versus distance graph. The abscissa represents distance; the ordinate, time. The six vertical lines represent the locations of shots (designated as F, G, H, I, J, and K). The symbol, X, denotes travel times at geophones that were located to the right of a shot. The symbol, @, denotes travel times that were located to the left of shots.

Velocity Cross Section (Lower Half of Figure)

This is an interpreted velocity cross section beneath the seismic line. The top line represents the ground-surface profile. The short vertical lines crossing the top line mark the geophone positions. The depth scale is plotted relative to a point on the line which was arbitrarily chosen as "zero elevation" at the time the line was surveyed. The additional lines across the cross section represent the interpreted boundaries between layers of material with different compressional wave velocities. These boundaries are commonly called "refractors". The velocity interpreted to be representative of each layer is shown.



SHOT F	G	H	I	J	K
GEOPHONES	1	7	18	24	



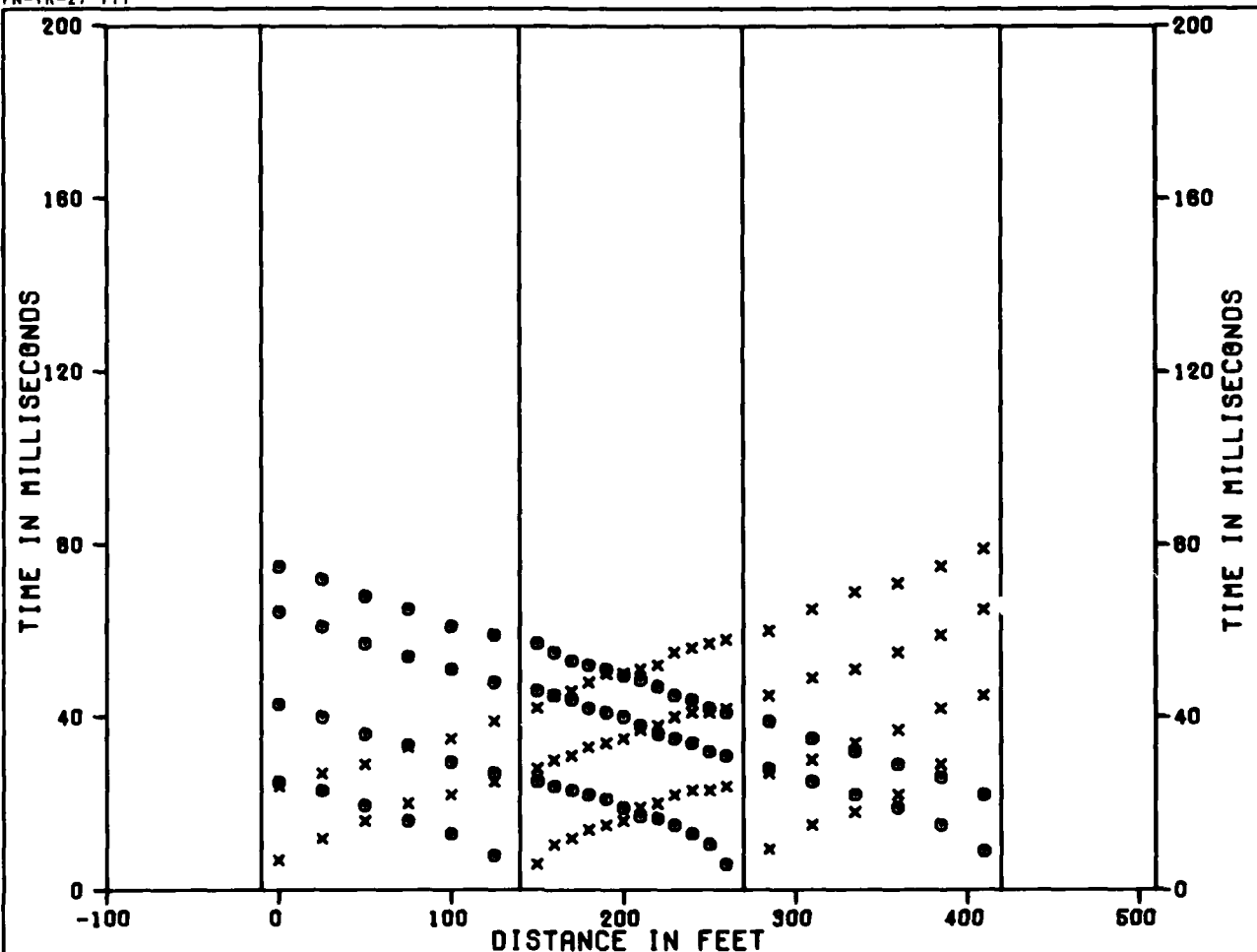
x TIMES TO RIGHT OF SHOTS
o TIMES TO LEFT OF SHOTS

SEISMIC REFRACTION LINE SE-S-1
TIME DISTANCE DATA AND VELOCITY PROFILE
VERIFICATION SITE, SNAKE EAST CDP, UTAH

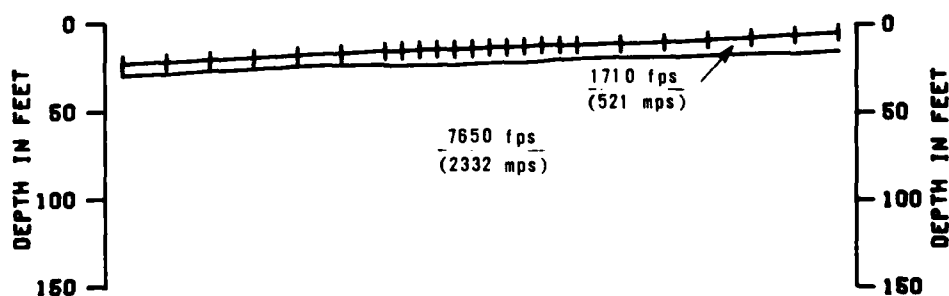
MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
3-1

FUGRO NATIONAL, INC.



SHOT F	0	H	I	J	K
GEOPHONES	1	7	18	24	



0 METERS 50
DISTANCE AND DEPTH

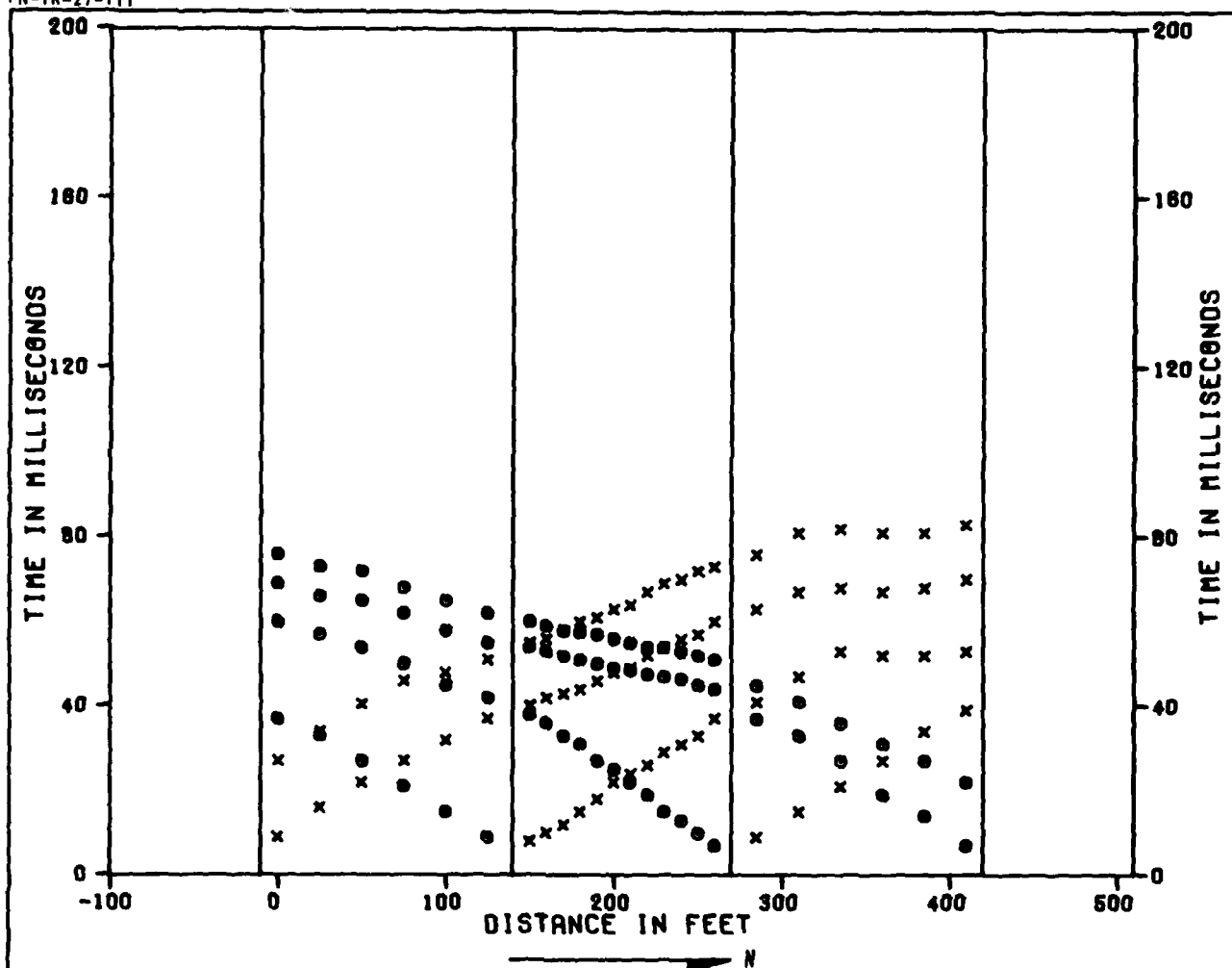
x TIMES TO RIGHT OF SHOTS
o TIMES TO LEFT OF SHOTS

SEISMIC REFRACTION LINE SE-S-3
TIME DISTANCE DATA AND VELOCITY PROFILE
VERIFICATION SITE, SNAKE EAST CDP, UTAH

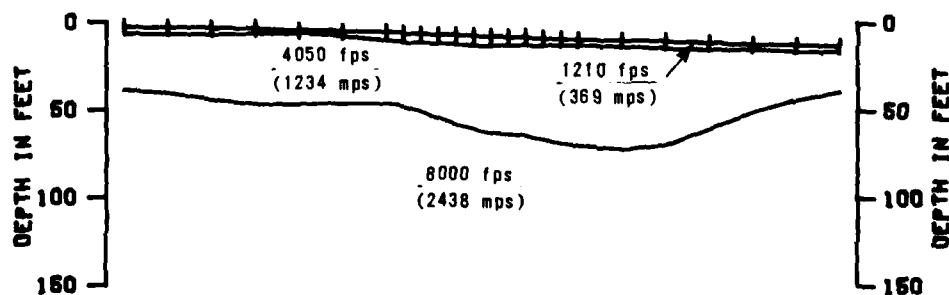
MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
3-3

UBRO NATIONAL, INC.



SHOT F	0	H	I	J	K
GEOPHONES	1	7	18	24	



0 METERS 50
DISTANCE AND DEPTH

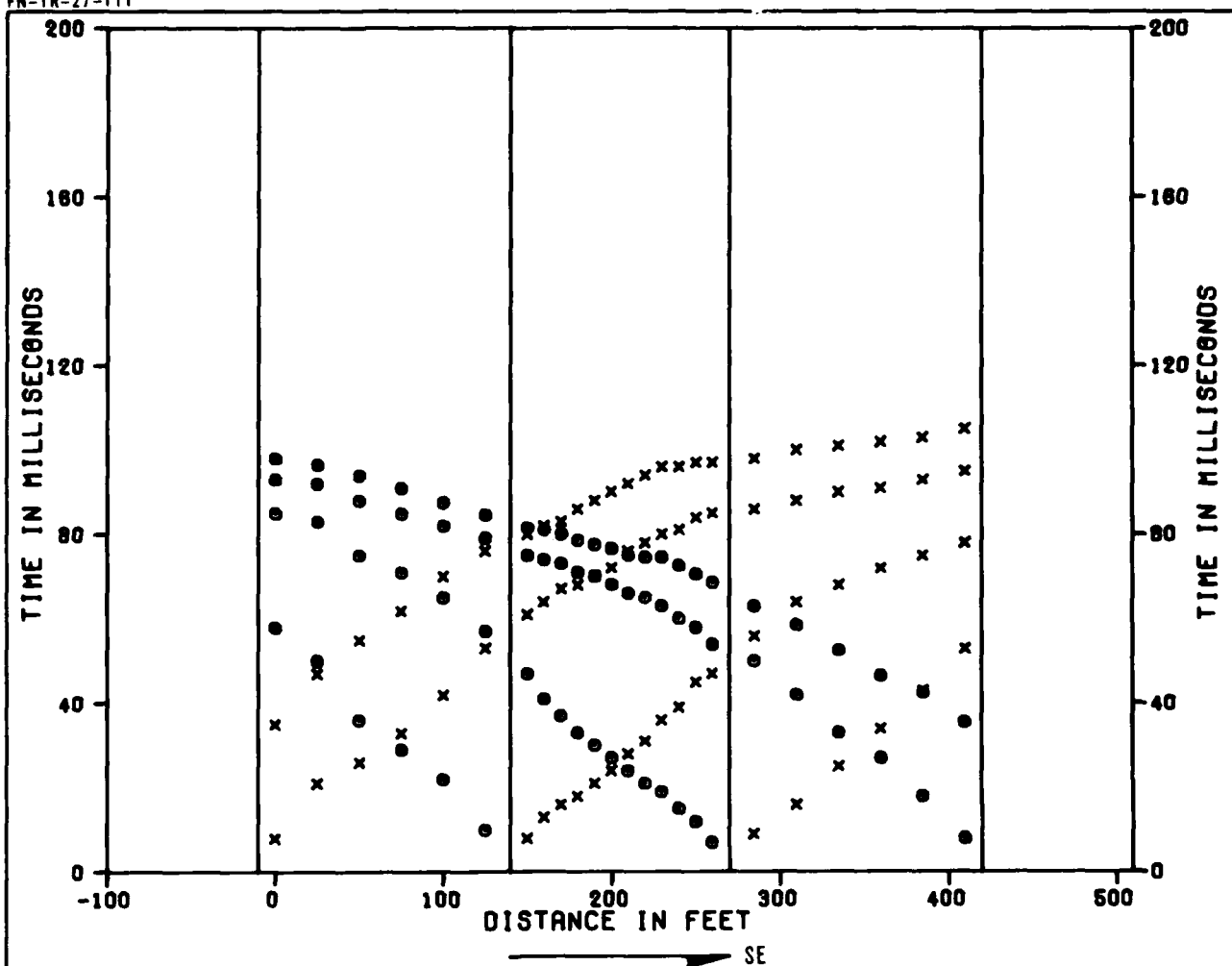
x TIMES TO RIGHT OF SHOTS
o TIMES TO LEFT OF SHOTS

SEISMIC REFRACTION LINE SE-S-4
TIME DISTANCE DATA AND VELOCITY PROFILE
VERIFICATION SITE, SNAKE EAST CDP, UTAH

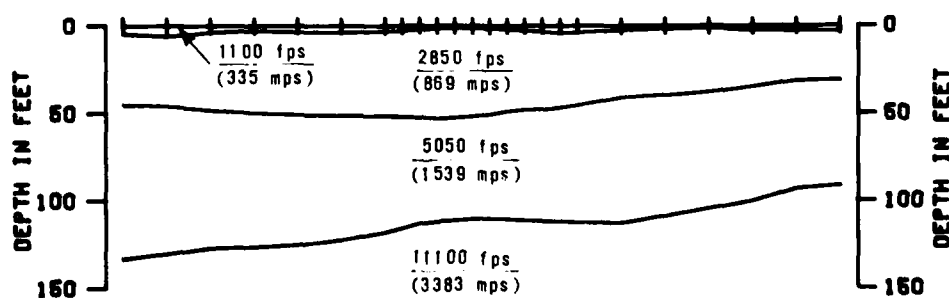
MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
3-4

FUGRO NATIONAL, INC.



SHOT K J I H G F
GEOPHONES 1 7 18 24



0 METERS 50
DISTANCE AND DEPTH

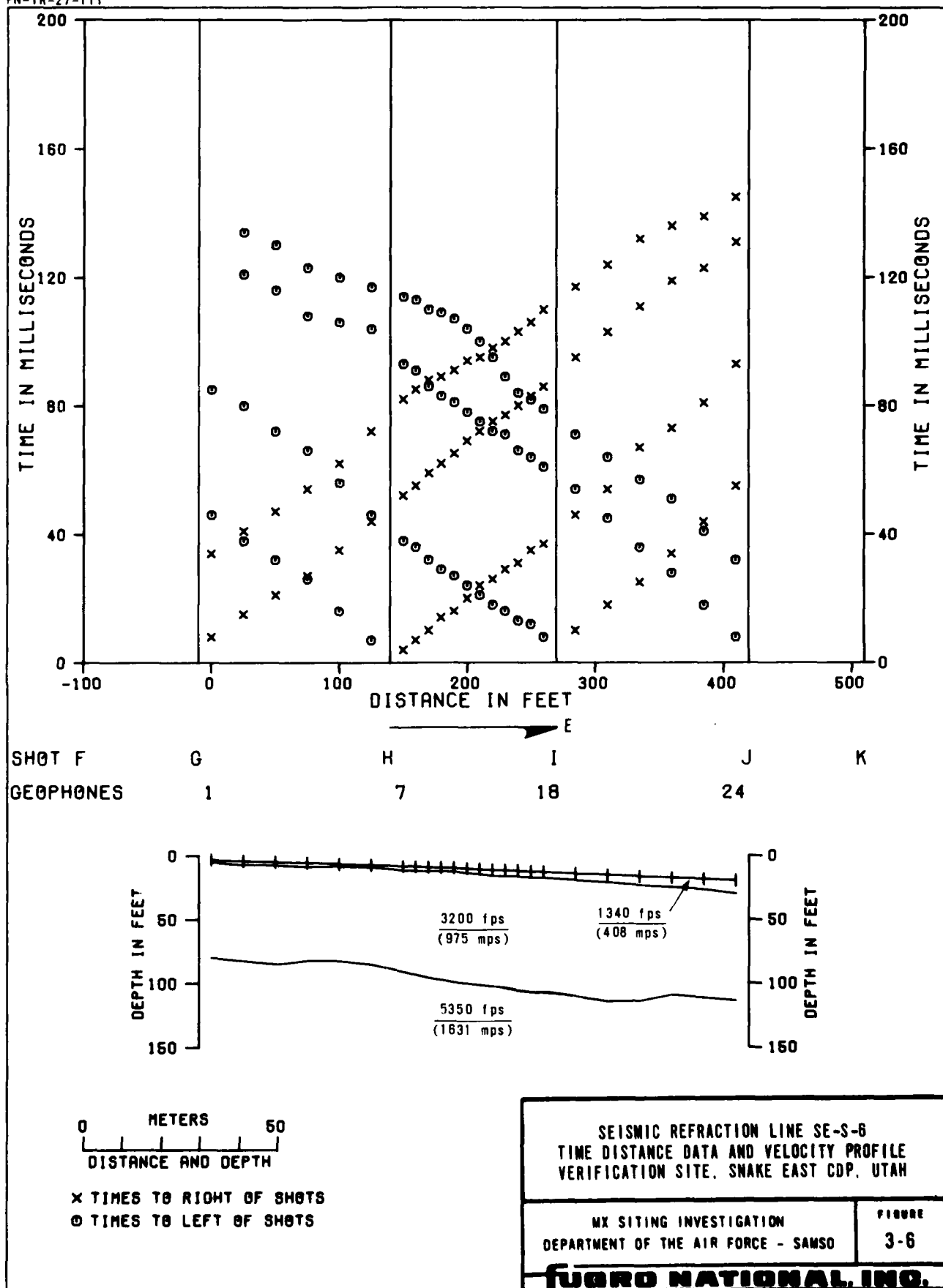
x TIMES TO RIGHT OF SHOTS
o TIMES TO LEFT OF SHOTS

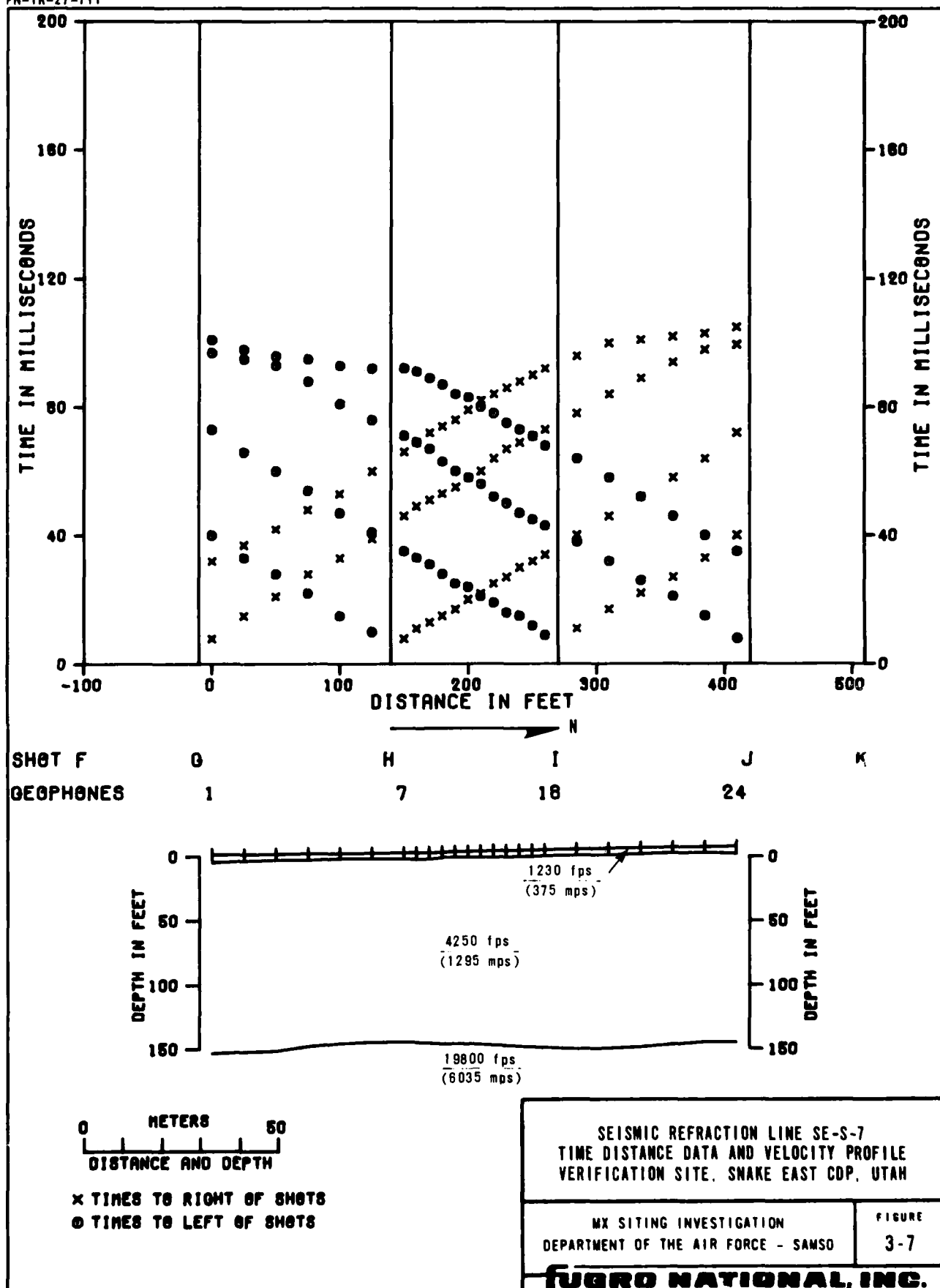
SEISMIC REFRACTION LINE SE-S-5
TIME DISTANCE DATA AND VELOCITY PROFILE
VERIFICATION SITE, SNAKE EAST CDP, UTAH

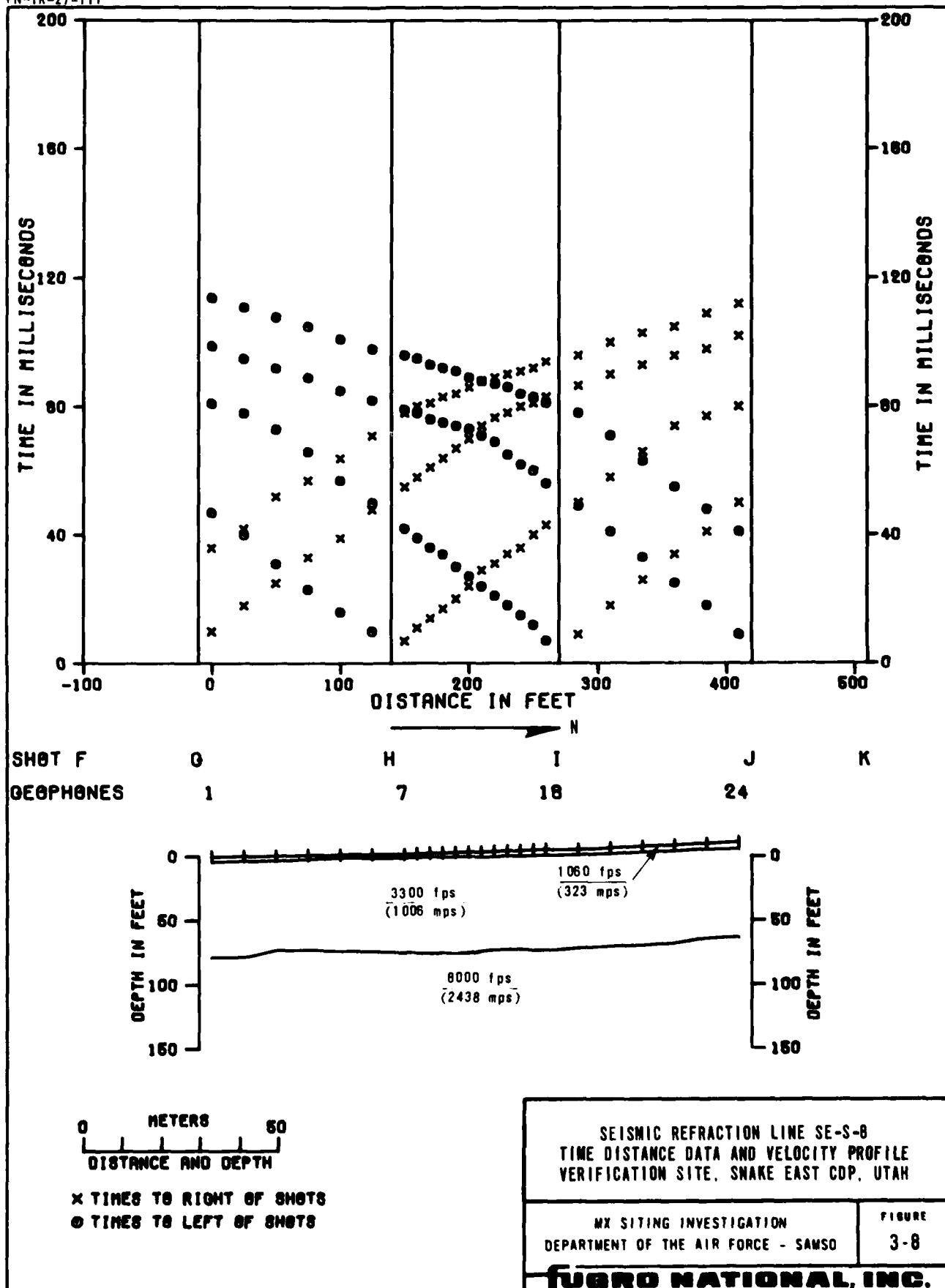
MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

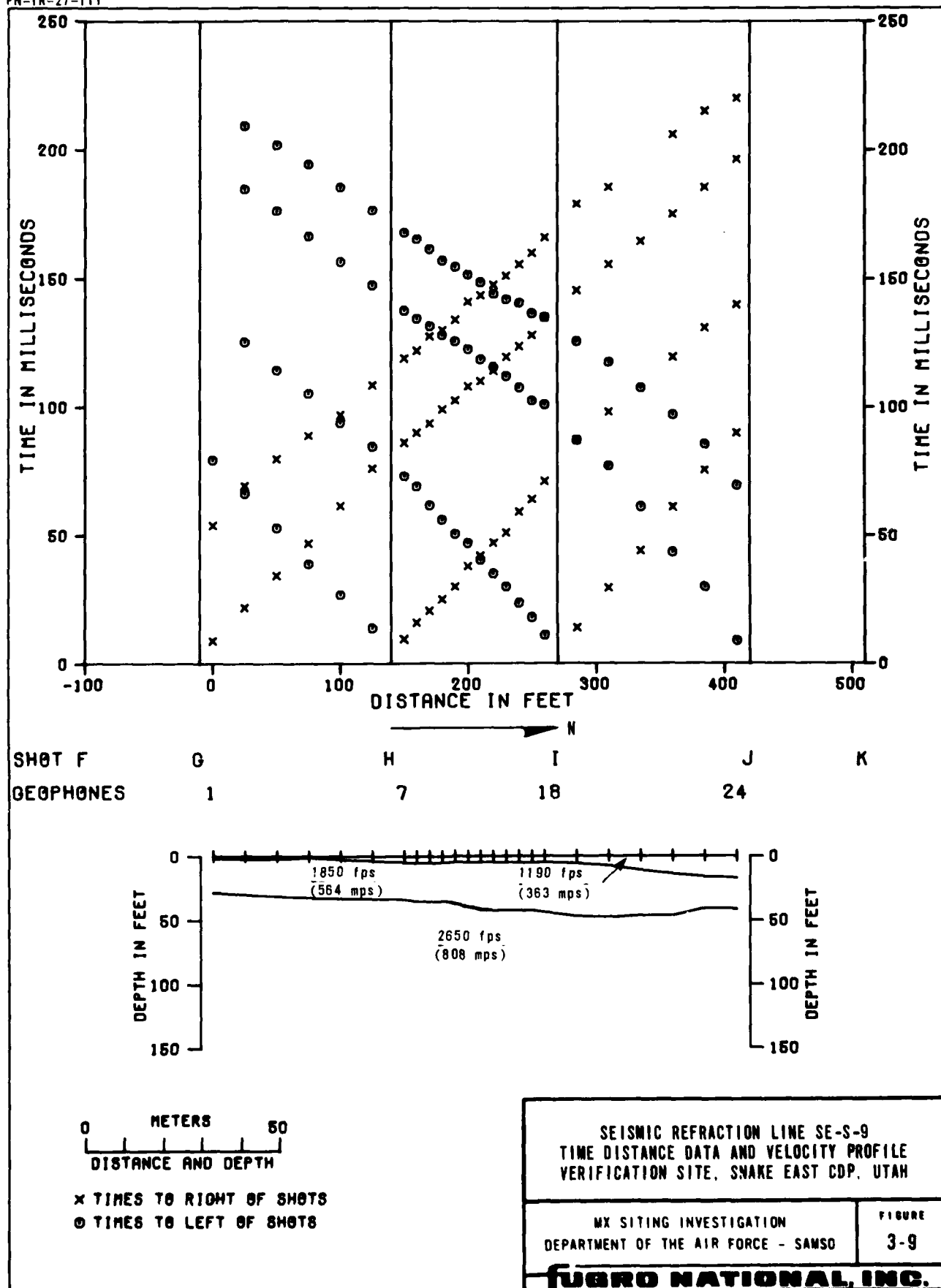
FIGURE
3-5

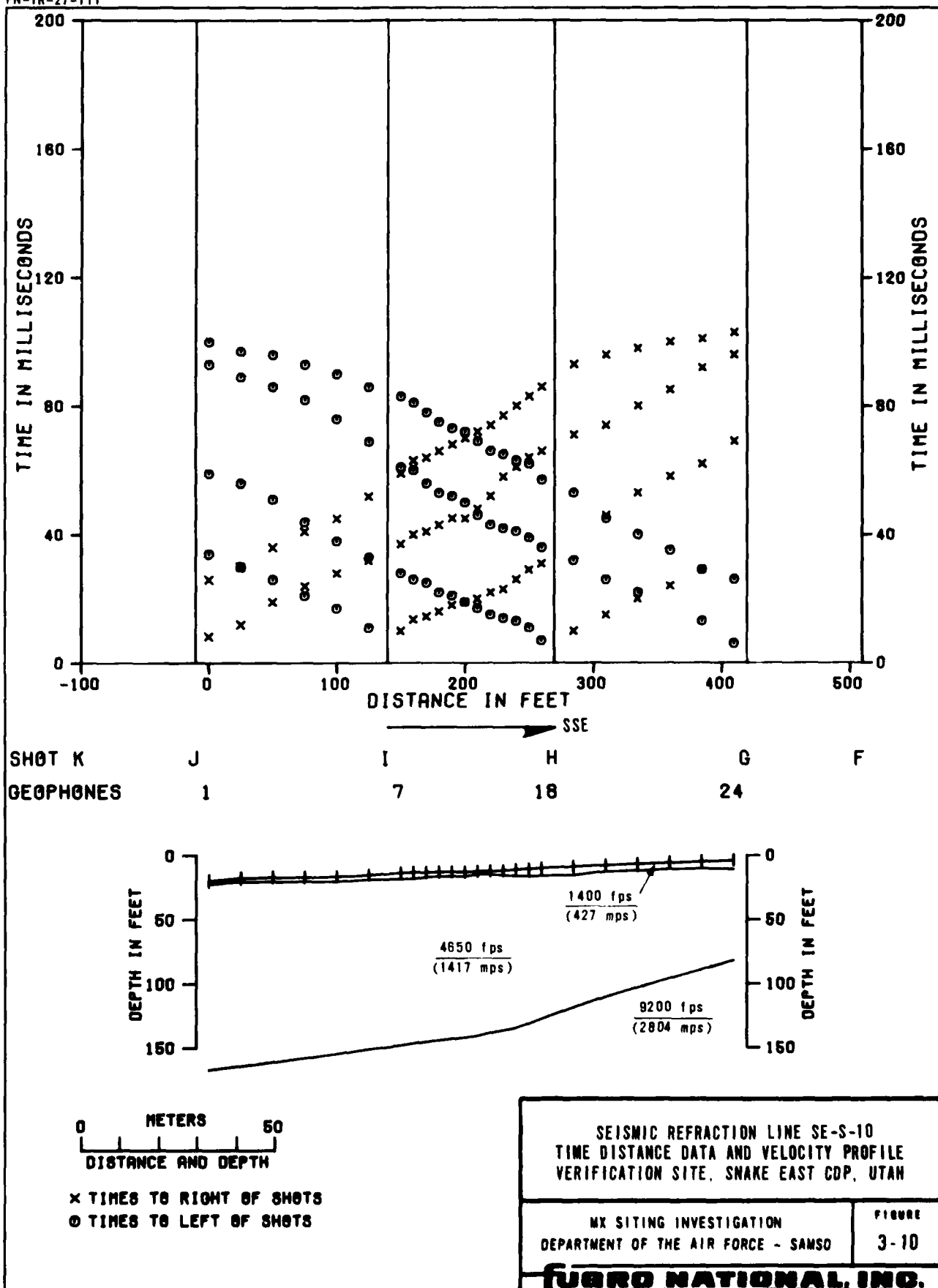
FUBRO NATIONAL, INC.

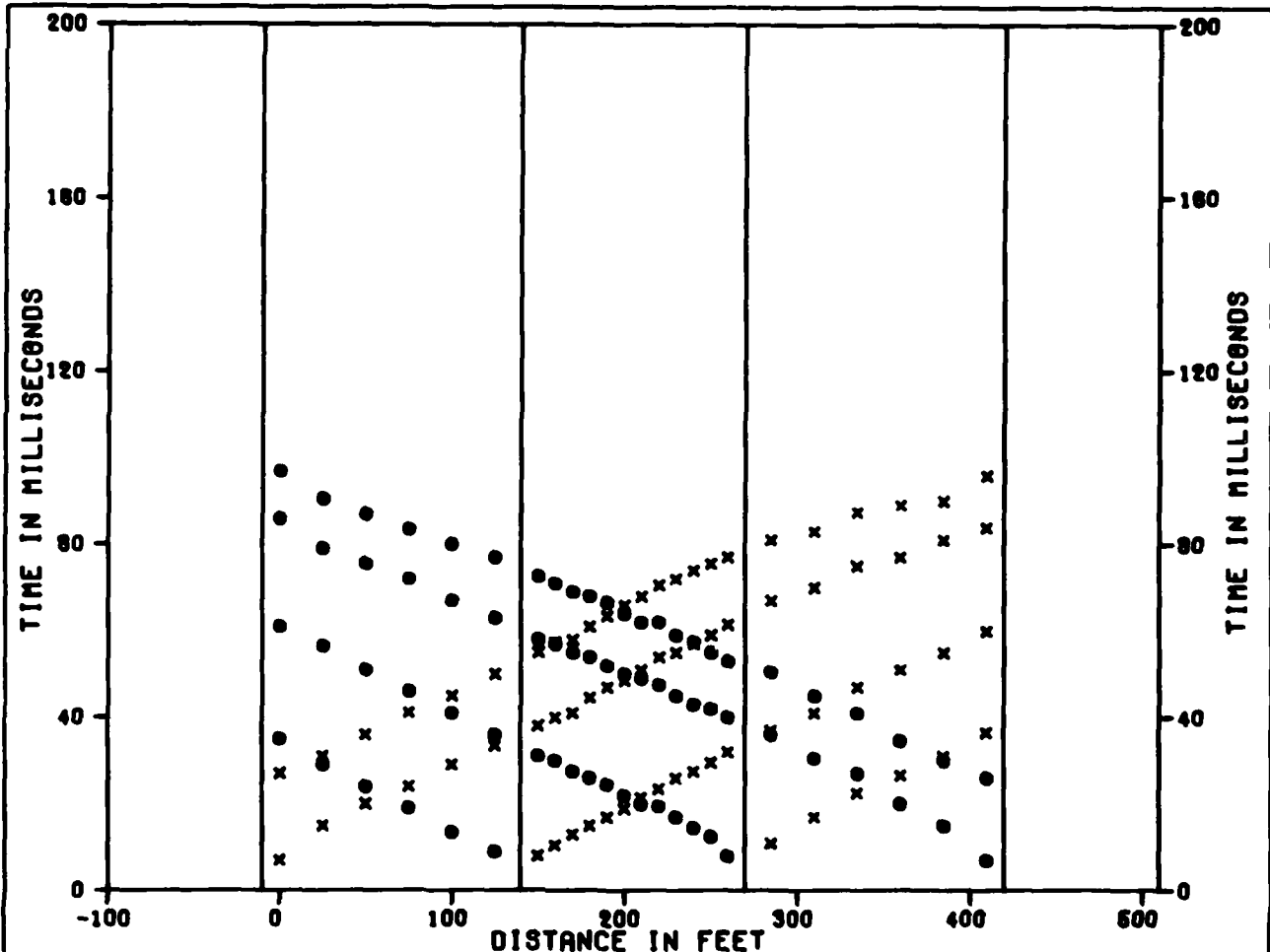




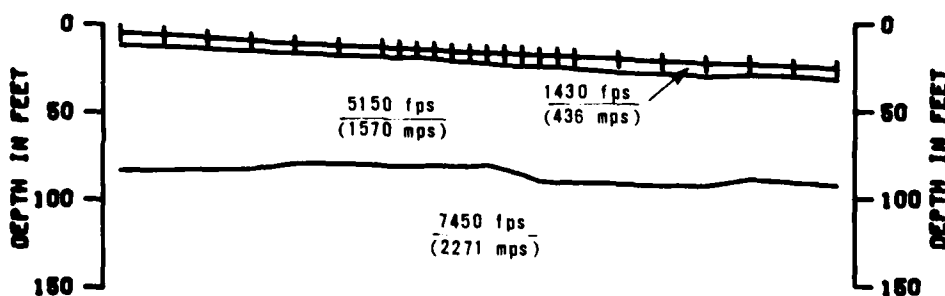








SHOT F	G	H	I	J	K
GEOPHONES	1	7	18	24	



0 METERS 50
DISTANCE AND DEPTH

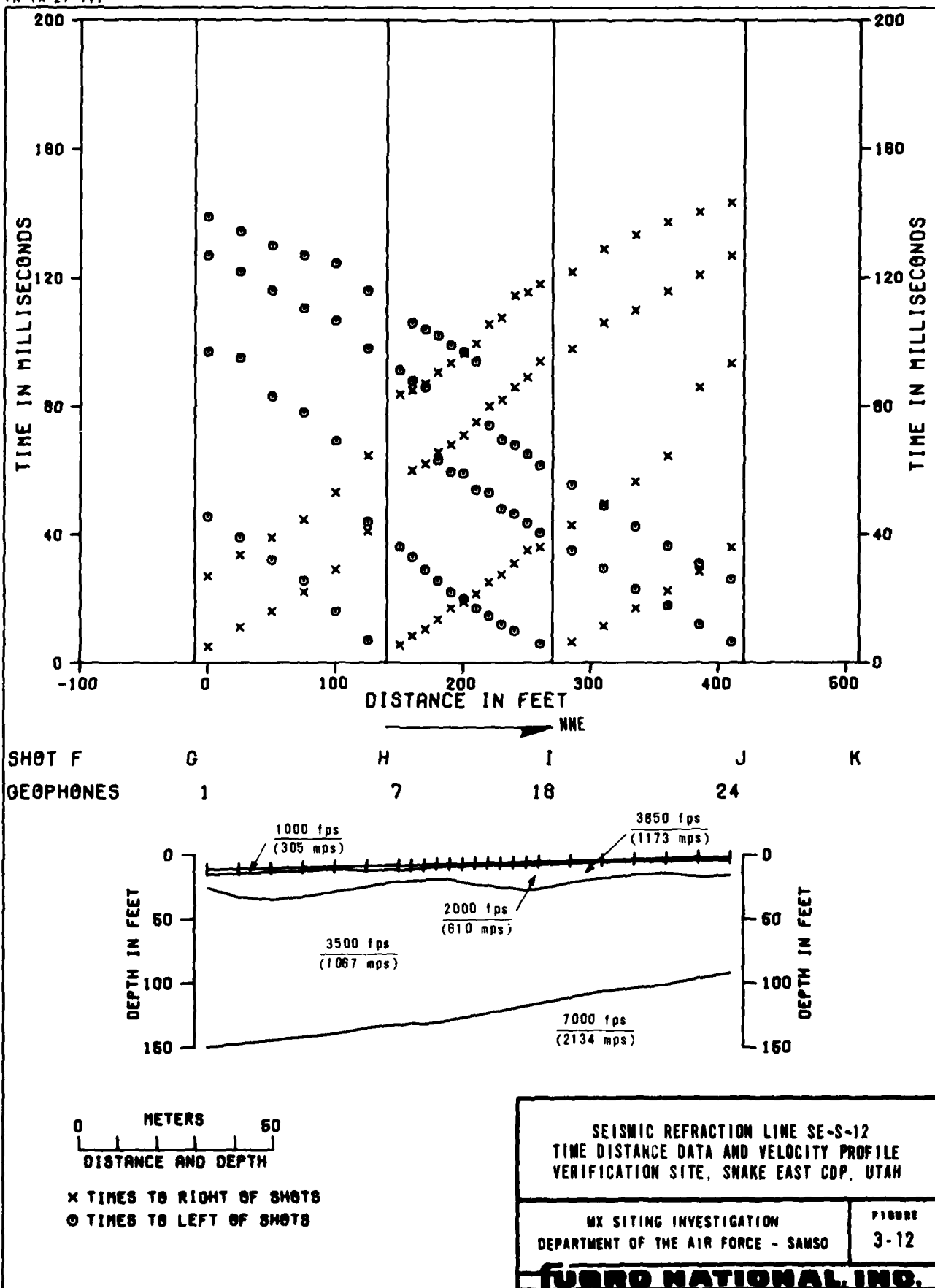
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o TIMES TO LEFT OF SHOTS

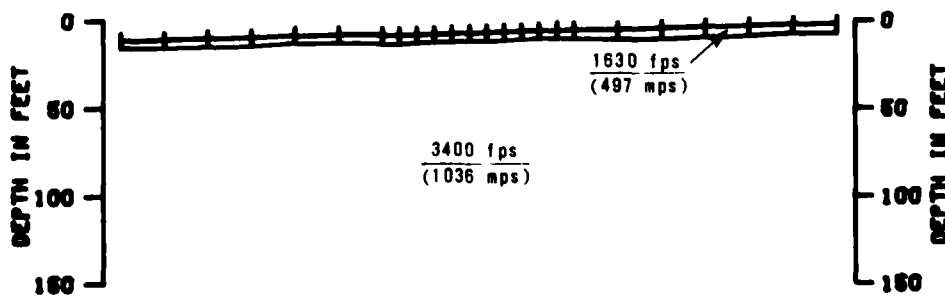
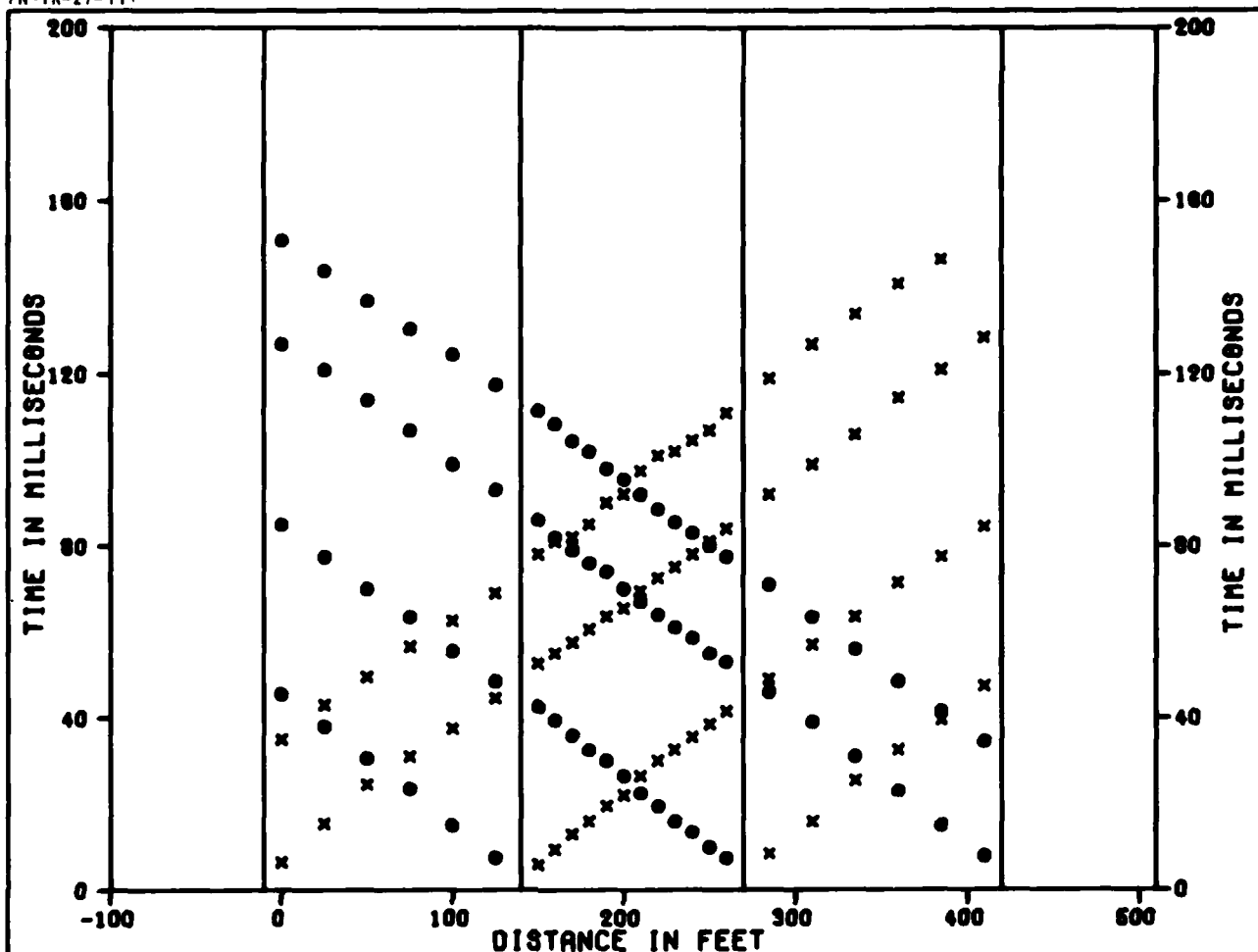
SEISMIC REFRACTION LINE SE-S-11
TIME DISTANCE DATA AND VELOCITY PROFILE
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
3-11

FUGRO NATIONAL, INC.





0 METERS 50
DISTANCE AND DEPTH

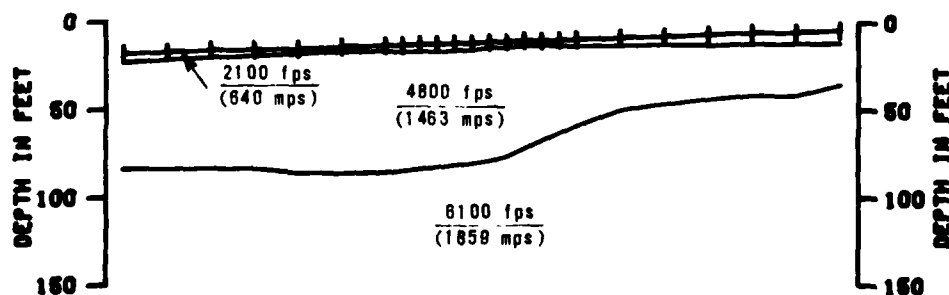
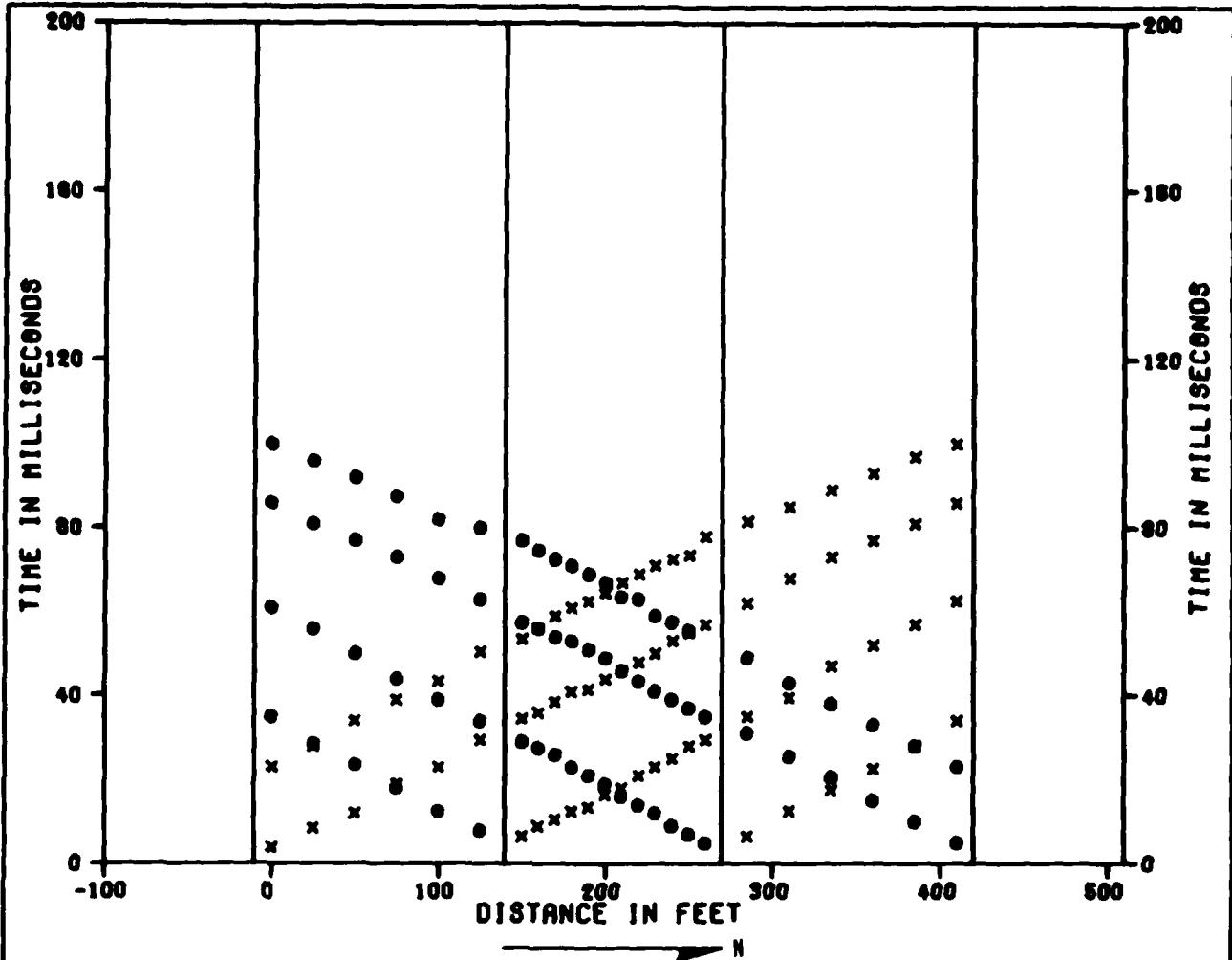
x TIMES TO RIGHT OF SHOTS
• TIMES TO LEFT OF SHOTS

SEISMIC REFRACTION LINE SE-S-13
TIME DISTANCE DATA AND VELOCITY PROFILE
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
3-13

FURRO NATIONAL, INC.



0 METERS 50
DISTANCE AND DEPTH

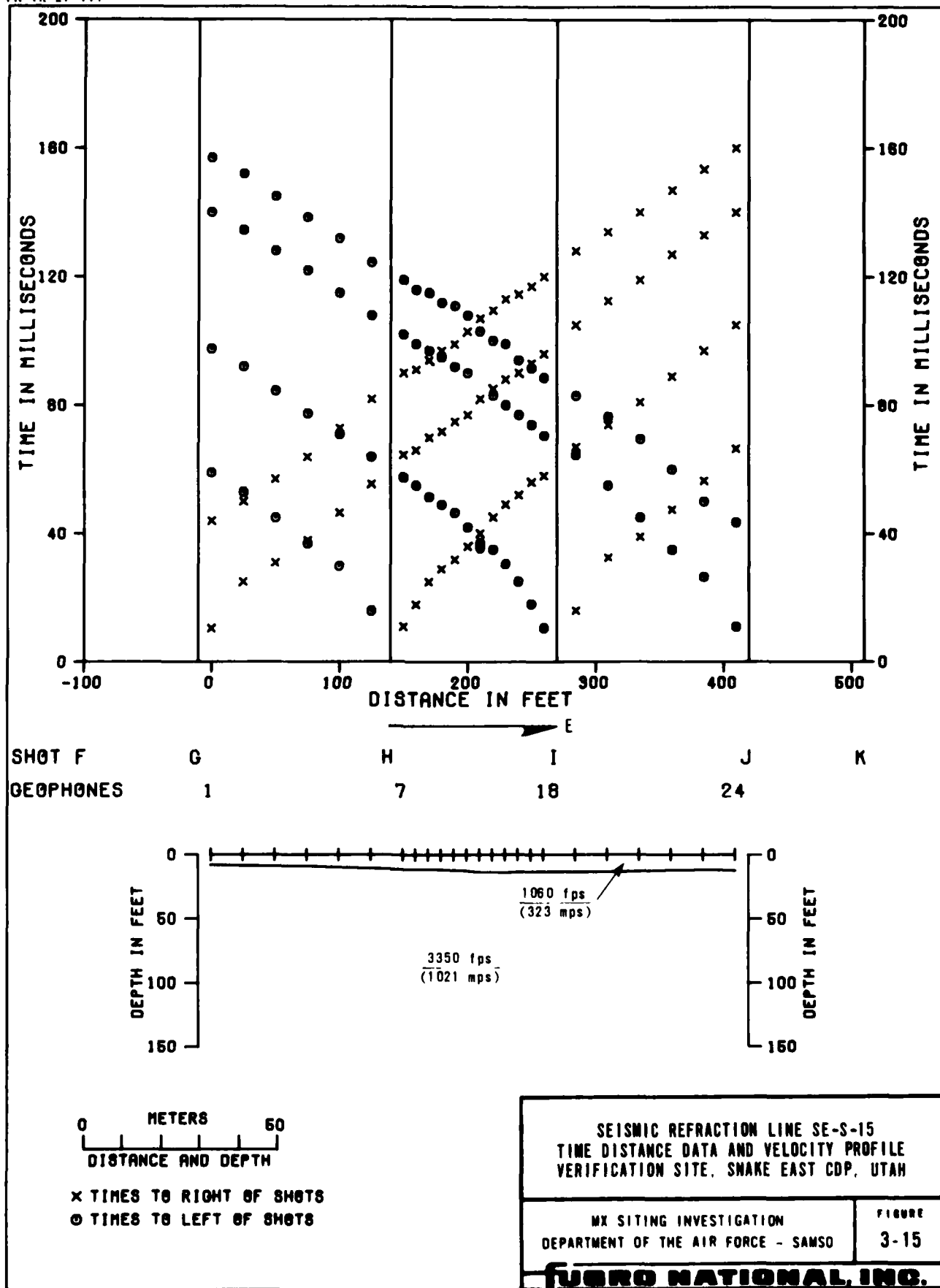
x TIMES TO RIGHT OF SHOTS
o TIMES TO LEFT OF SHOTS

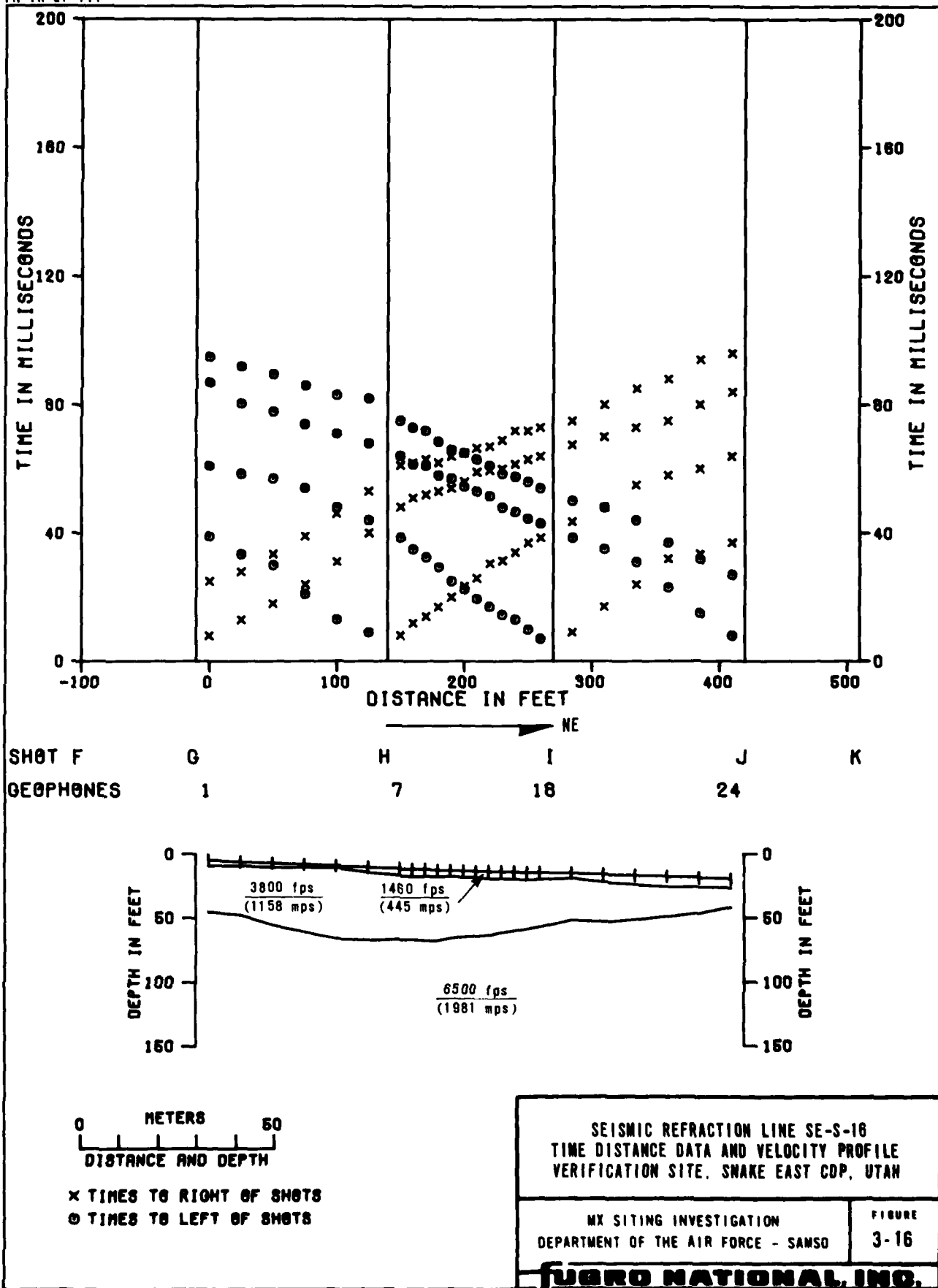
SEISMIC REFRACTION LINE SE-S-14
TIME DISTANCE DATA AND VELOCITY PROFILE
VERIFICATION SITE, SNAKE EAST CDP, UTAH

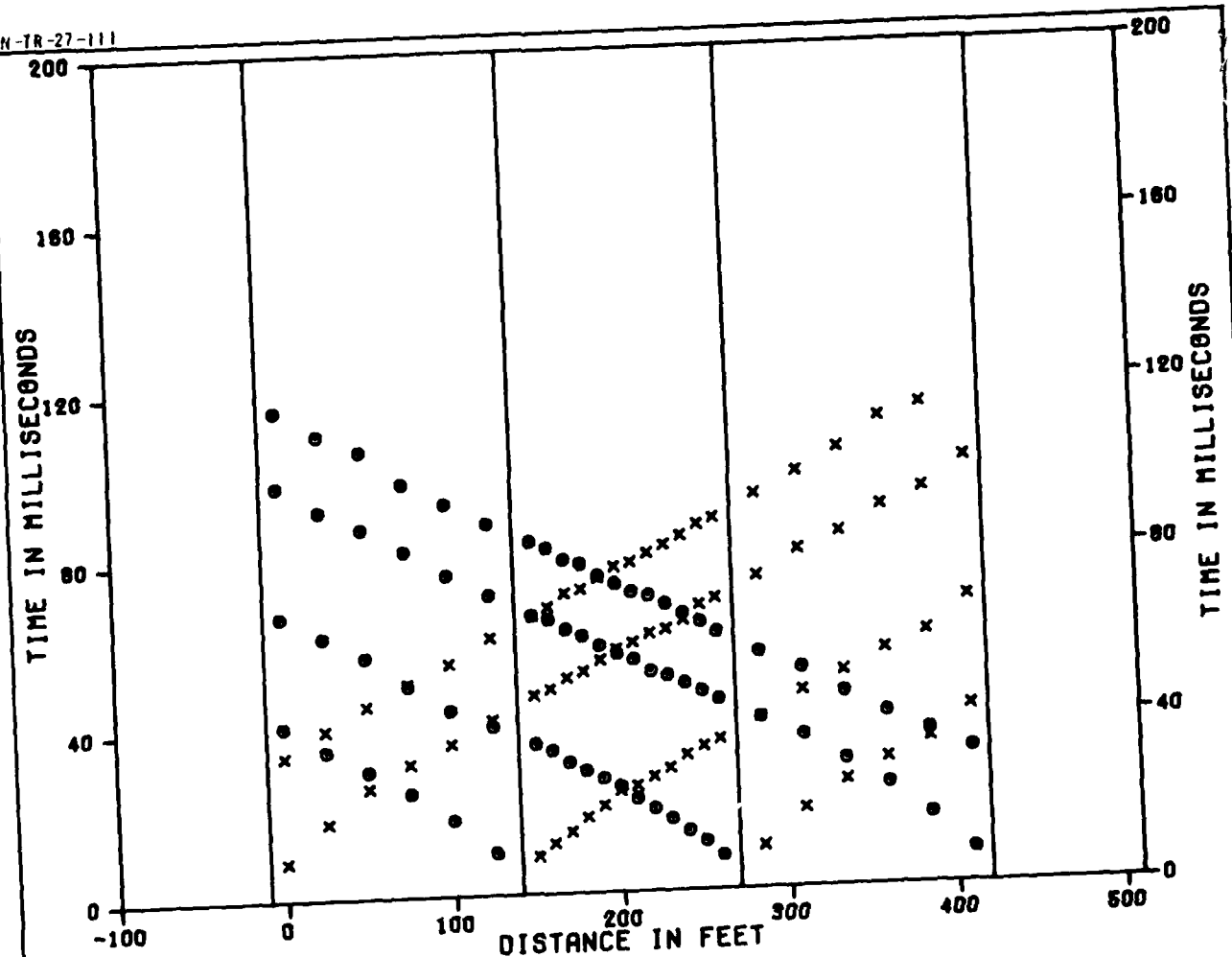
MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
3-14

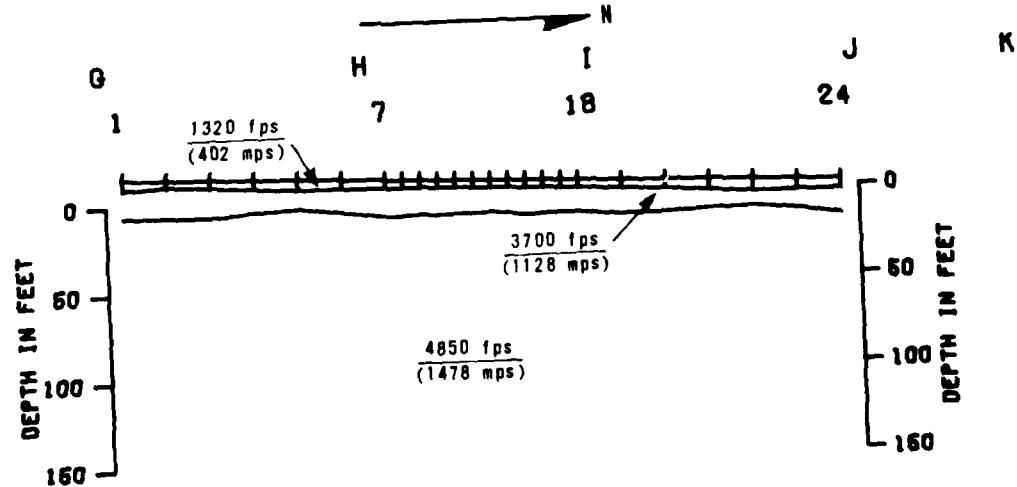
FUGRO NATIONAL INC.







SHOT F
GEOPHONES



0 METERS 50
DISTANCE AND DEPTH

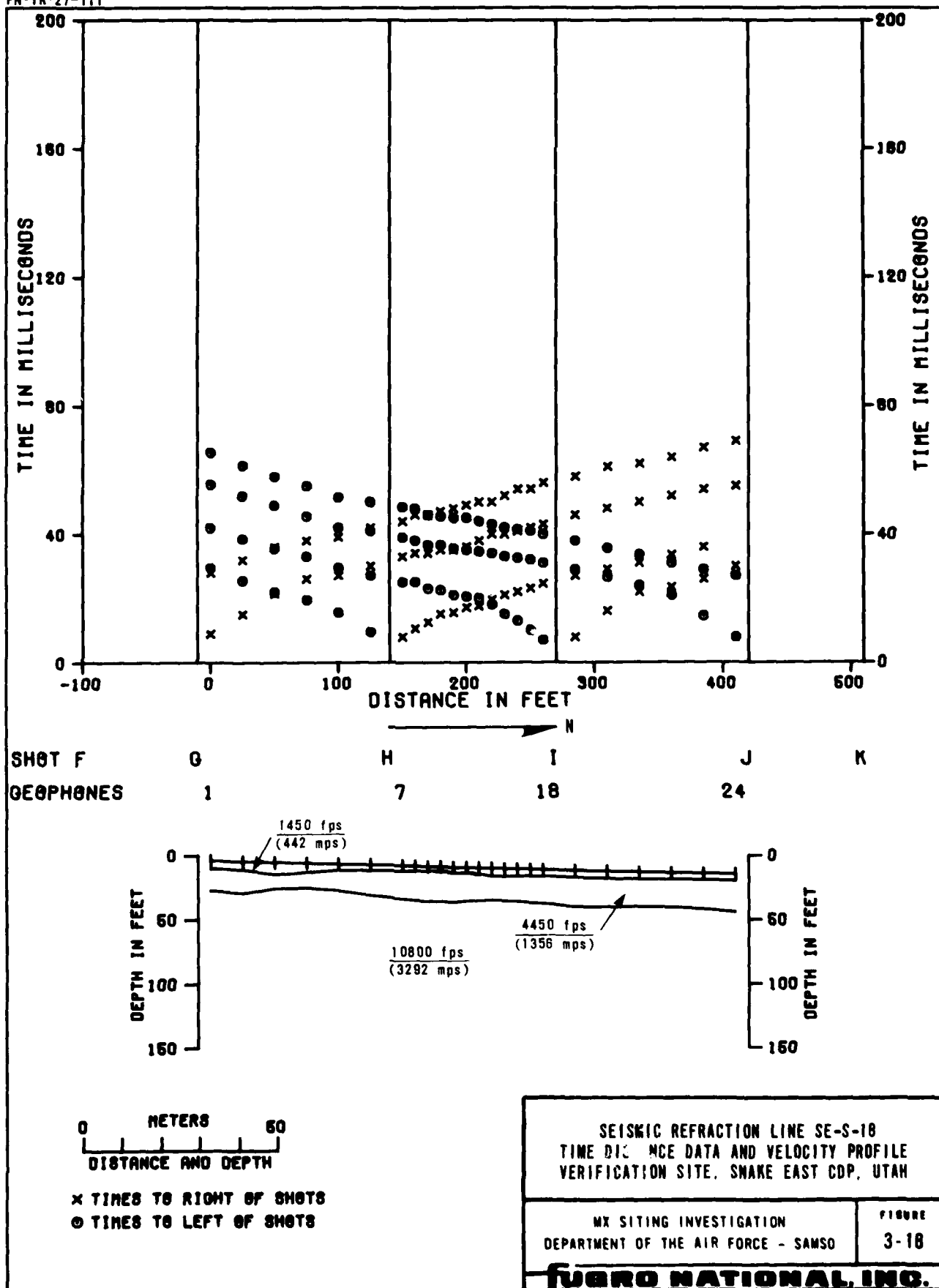
x TIMES TO RIGHT OF SHOTS
o TIMES TO LEFT OF SHOTS

SEISMIC REFRACTION LINE SE-S-17
TIME DISTANCE DATA AND VELOCITY PROFILE
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSCO

FIGURE
3-17

FURRO NATIONAL, INC.



SECTION 4.0

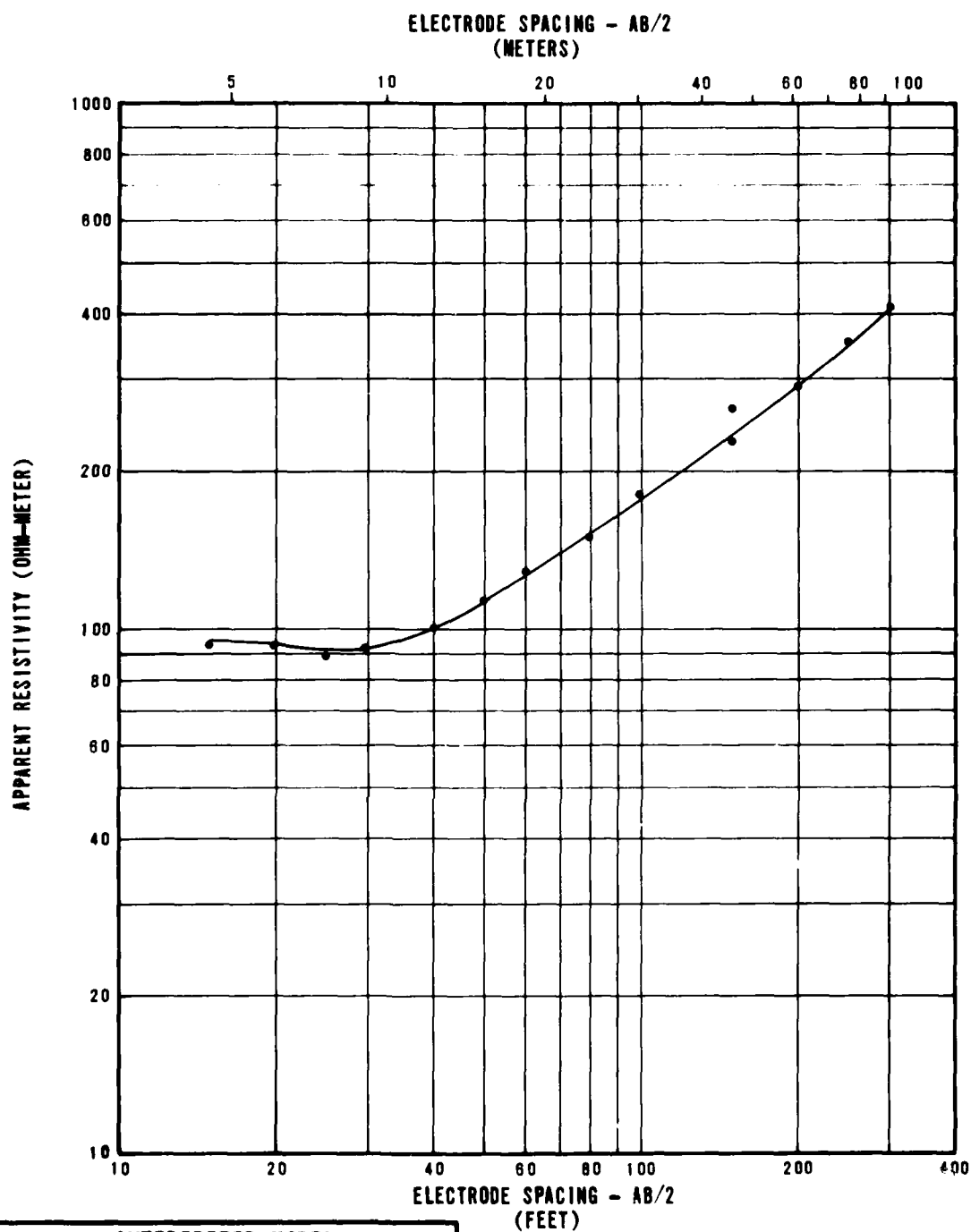
ELECTRICAL RESISTIVITY DATA

EXPLANATIONS OF ELECTRICAL RESISTIVITY DATA

Each figure in this section presents the data obtained from a resistivity sounding and a tabulated model of resistivity layers that would produce a curve similar to the observed curve.

The upper portion of the figures is a graph in which measured apparent resistivity values in ohm-meters are plotted versus one-half the distance between the current electrodes.

The interpreted model tabulated at the bottom of the page shows a combination of true resistivity layers and thicknesses obtained by matching theoretical curves to the field curve.



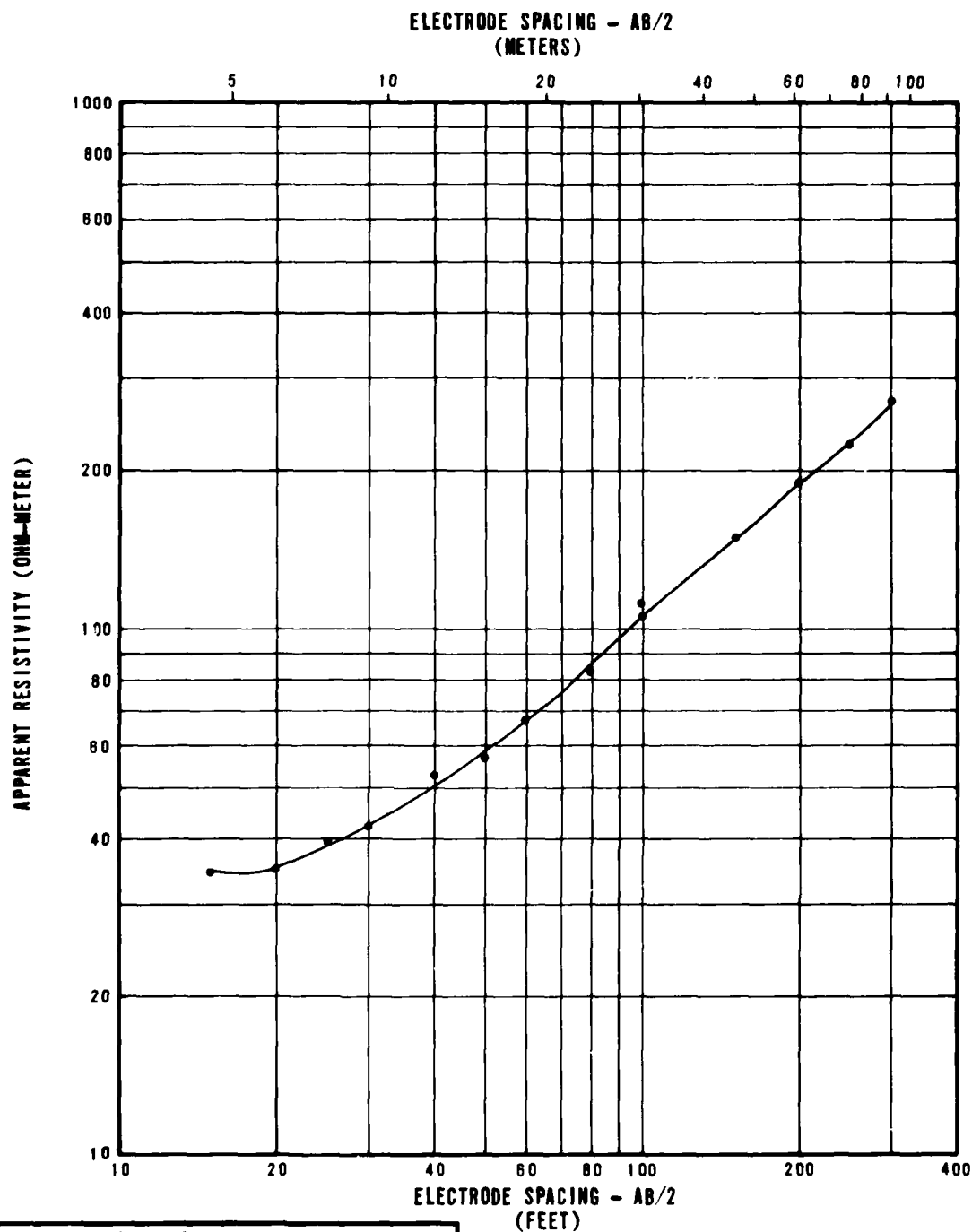
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	100
11	3	70
32	10	470
131	40	1880

RESISTIVITY SOUNDING SE-R-1
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, SNAKE EAST COP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
4-1

FUSCO NATIONAL, INC.



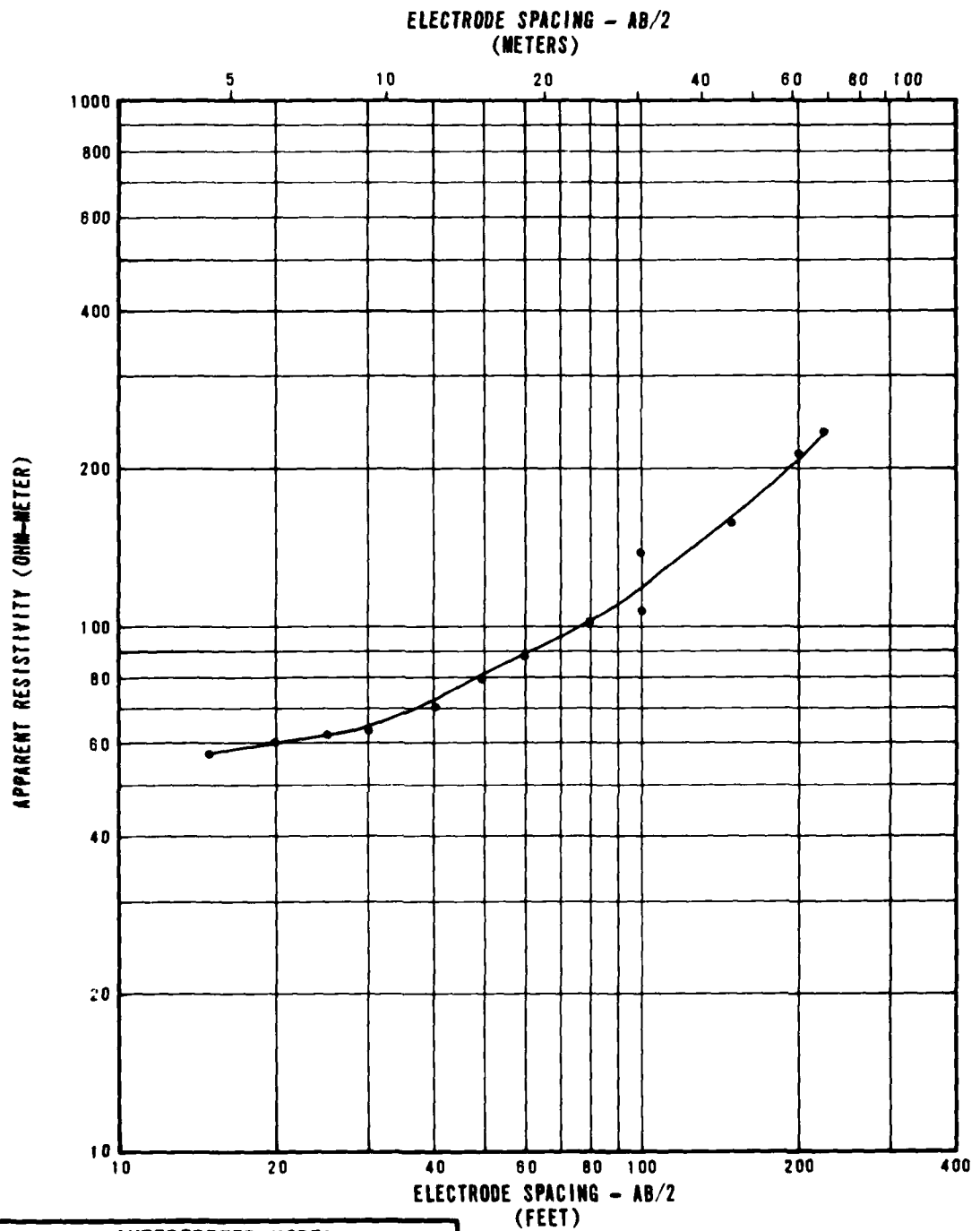
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	35
25	8	130
44	13	790
67	20	1300

**RESISTIVITY SOUNDING SE-R-2
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, SNAKE EAST CDP, UTAH**

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
4-2

FURRO NATIONAL INC.



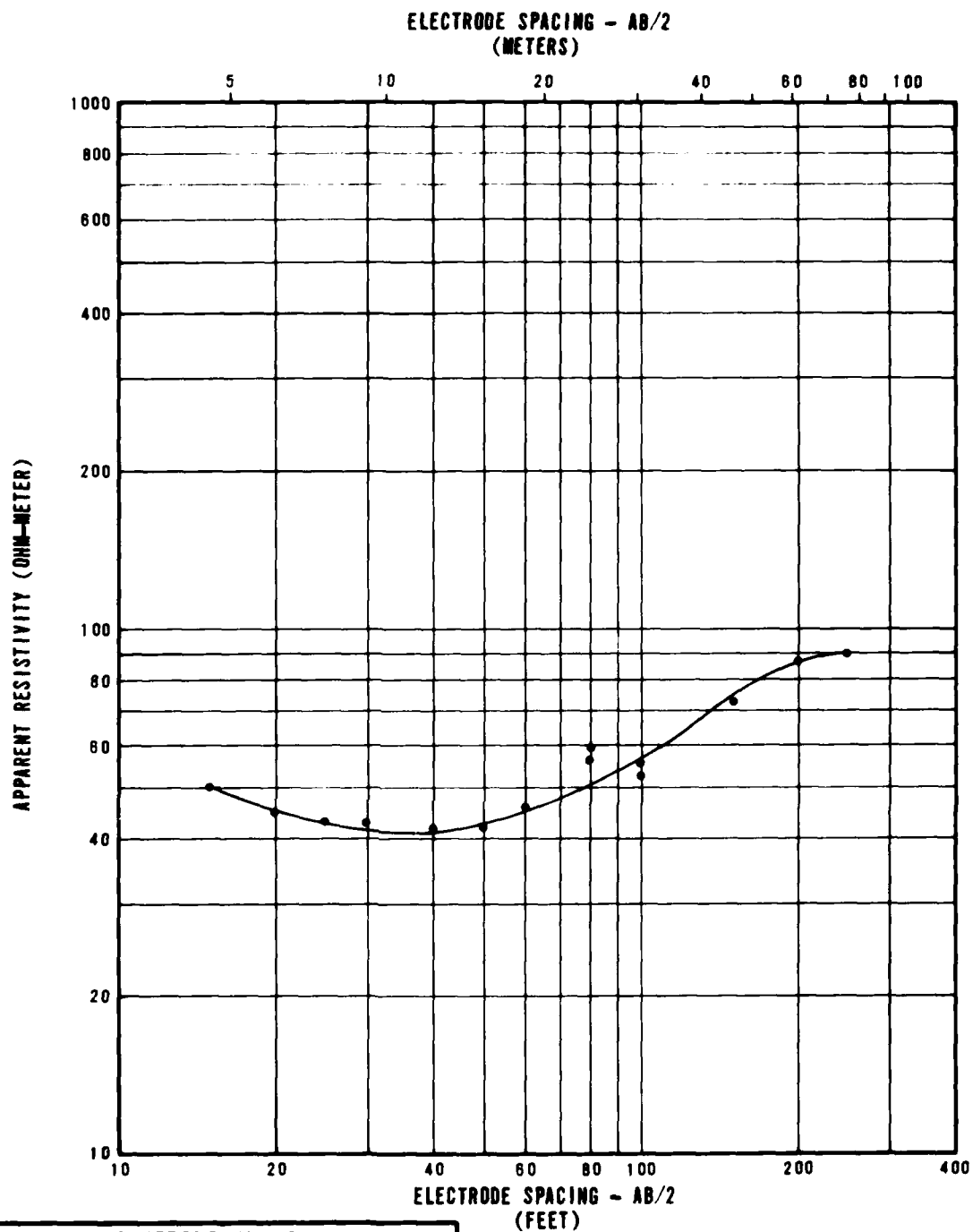
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	55
28	9	220
100	30	980

RESISTIVITY SOUNDING SE-R-3
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
4-3

FURRO NATIONAL, INC.



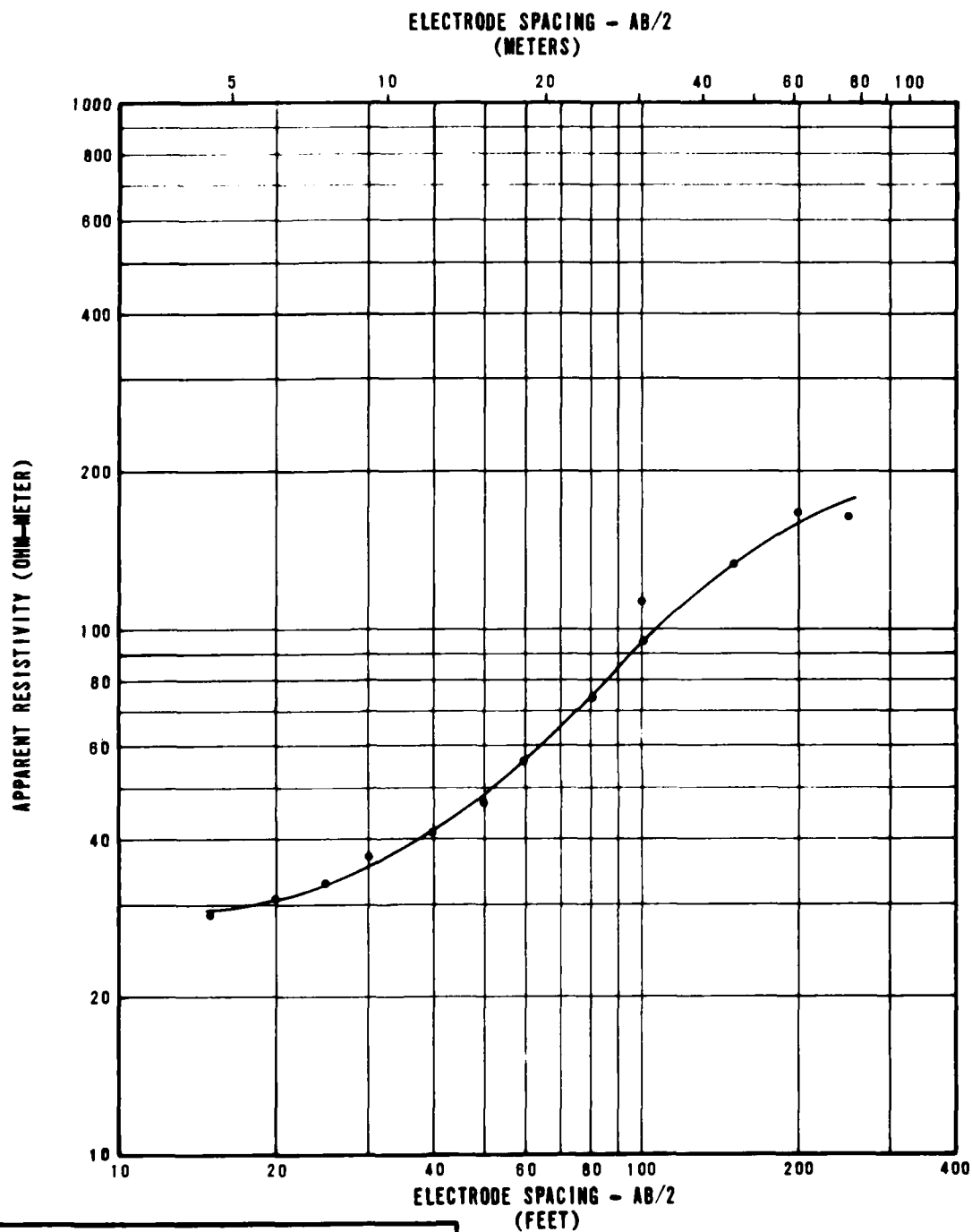
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	55
12	4	30
45	14	150
156	48	100

RESISTIVITY SOUNDING SE-R-4
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMS0

FIGURE
4-4

VERRO NATIONAL INC.



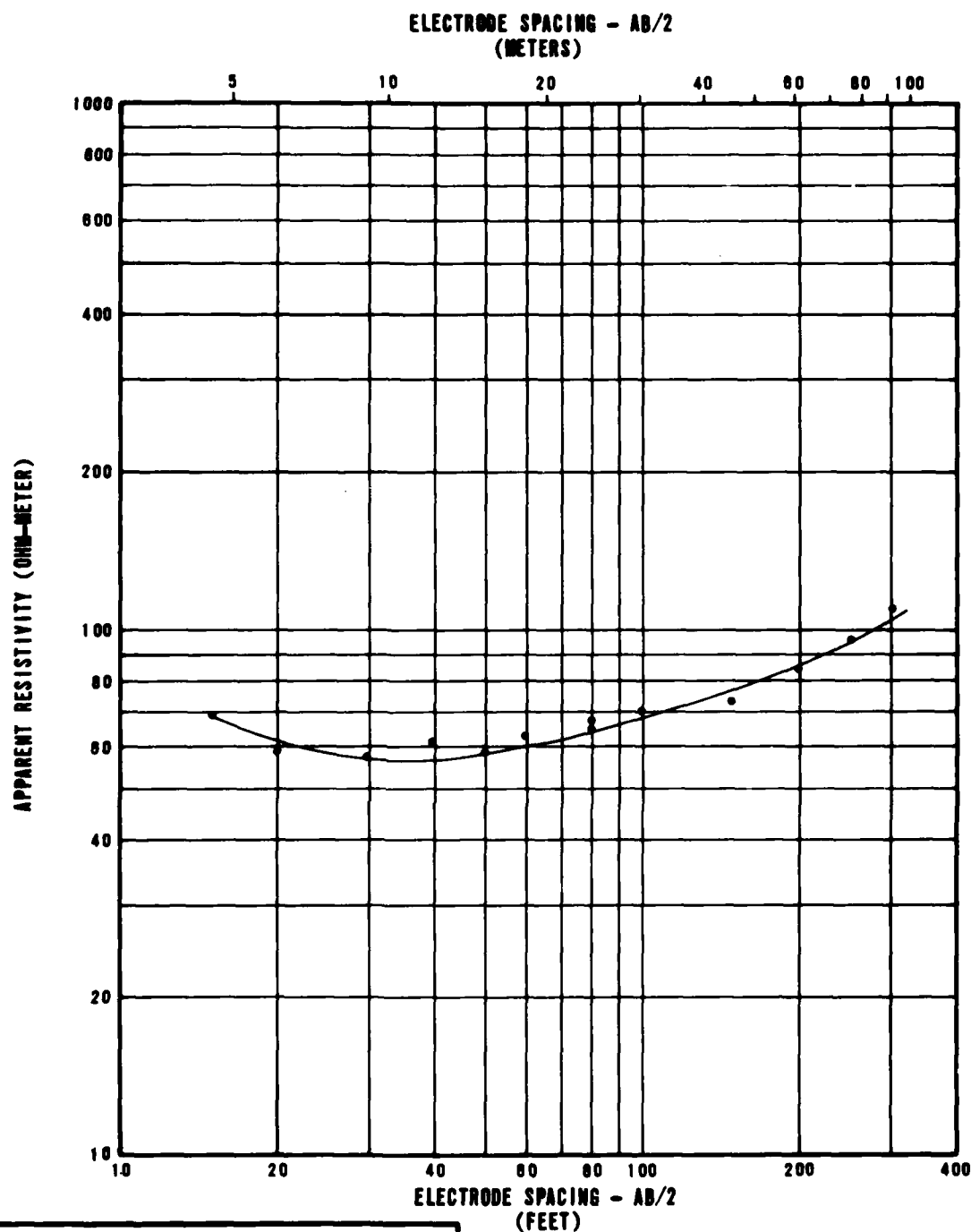
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	30
21	6	120
54	18	570
108	32	370

RESISTIVITY SOUNDING SE-R-5
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SANSO

FIGURE
4-5

FUERO NATIONAL INC.



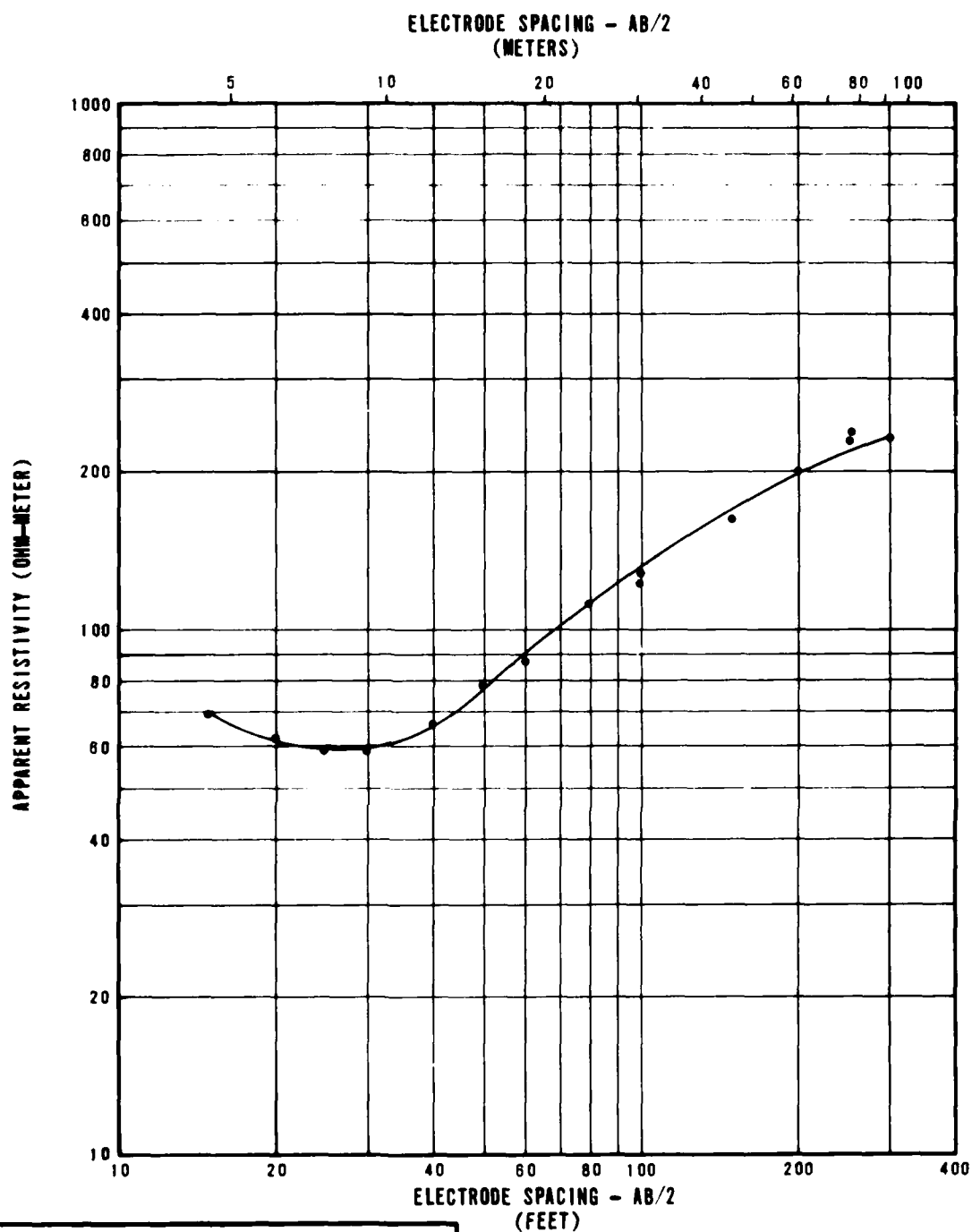
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	75
11	3	45
38	12	95

RESISTIVITY SOUNDING SE-R-6
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
4-6

FURRO NATIONAL INC.



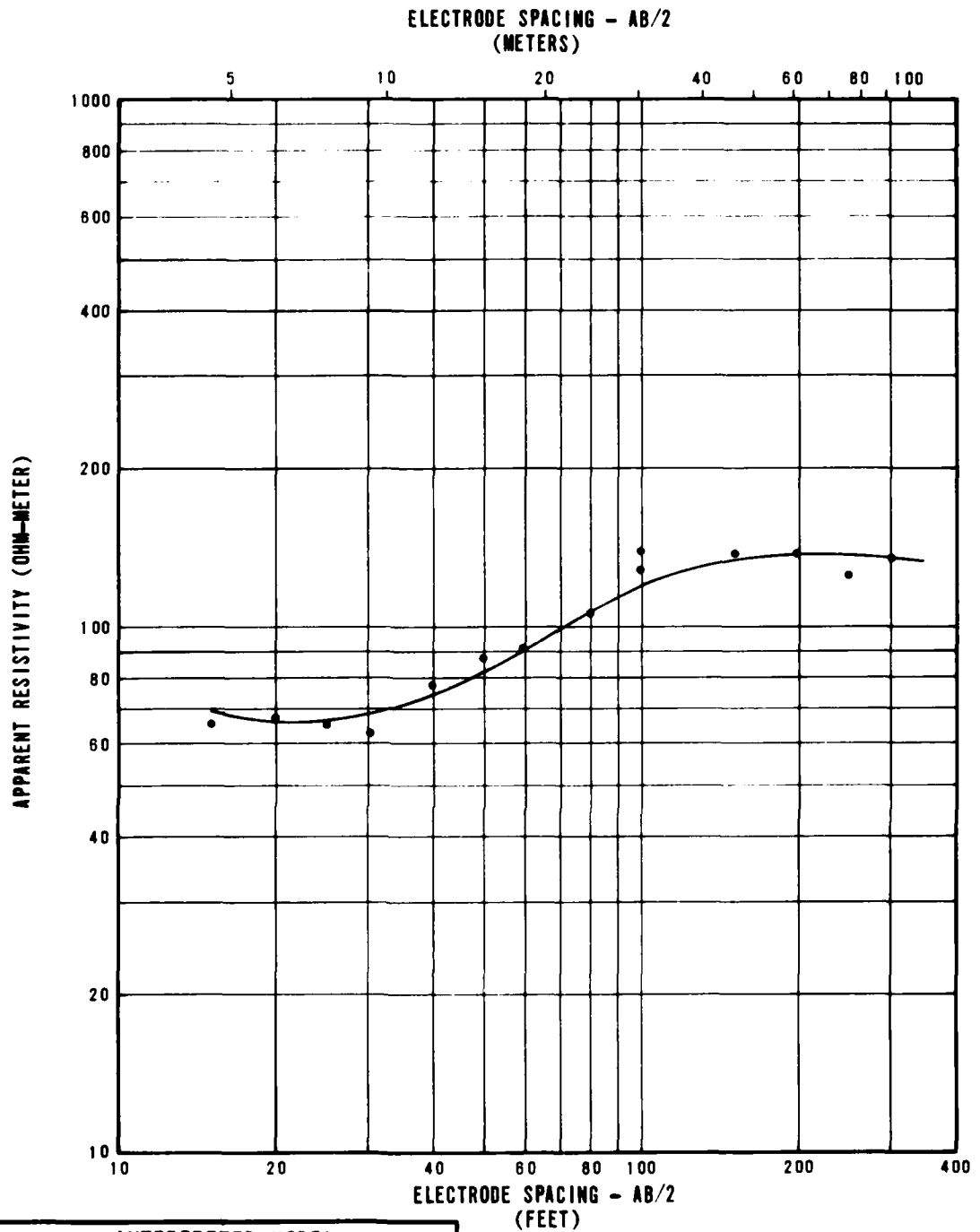
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	90
7	2	45
30	9	900
48	14	310

RESISTIVITY SOUNDING SE-R-7
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SANSO

FIGURE
4-7

FURRO NATIONAL, INC.



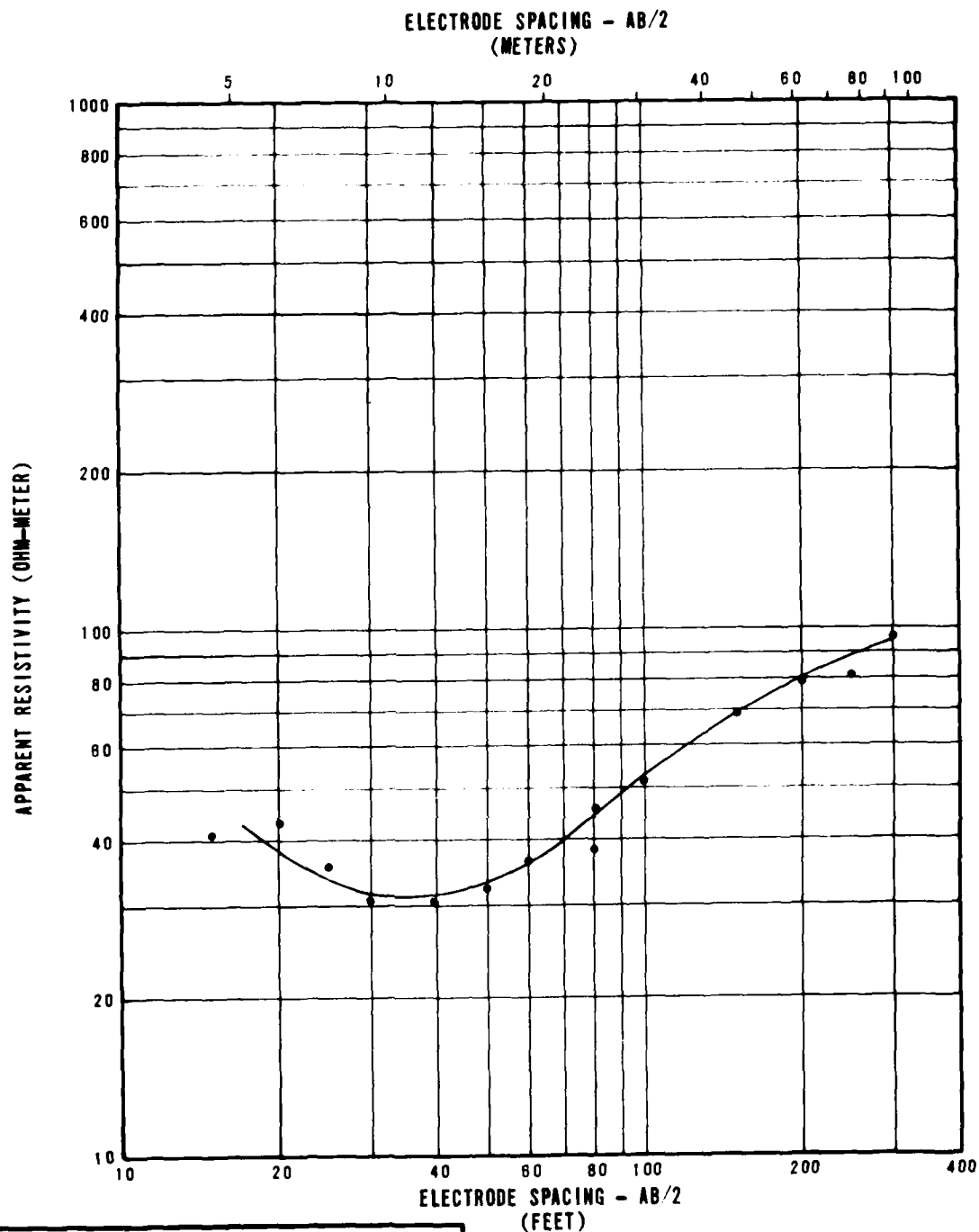
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	75
9	3	50
28	9	290
82	25	90

RESISTIVITY SOUNDING SE-R-8
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMS0

FIGURE
4-8

FURRO NATIONAL, INC.



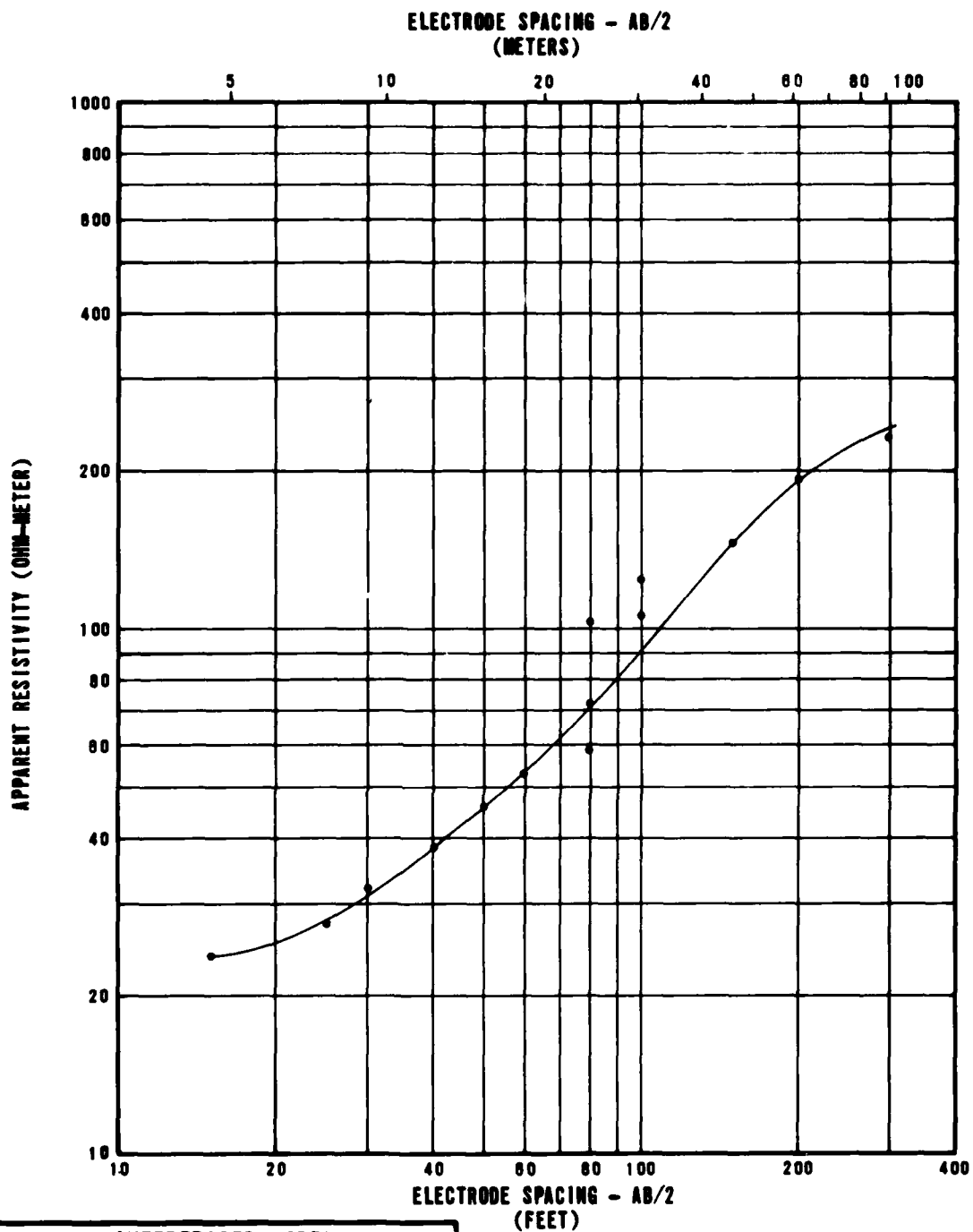
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	50
8	2	25
42	13	250
68	21	130

RESISTIVITY SOUNDING SE-R-9
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, SNAKE EAST COP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMS0

FIGURE
4-9

FUGRO NATIONAL INC.



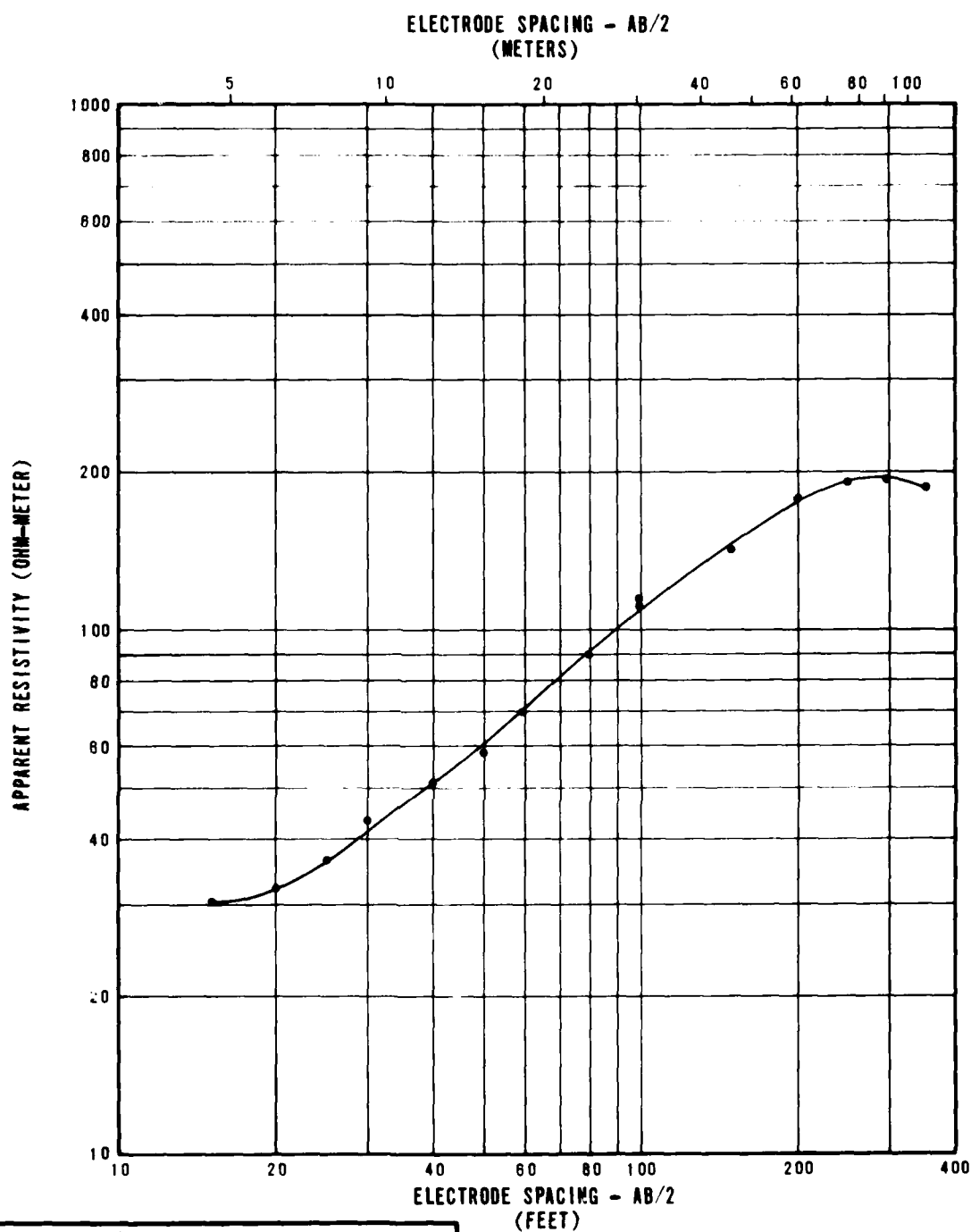
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	20
21	6	110
49	15	1150

RESISTIVITY SOUNDING SE-R-10
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
4-10

FLUORO NATIONAL INC.



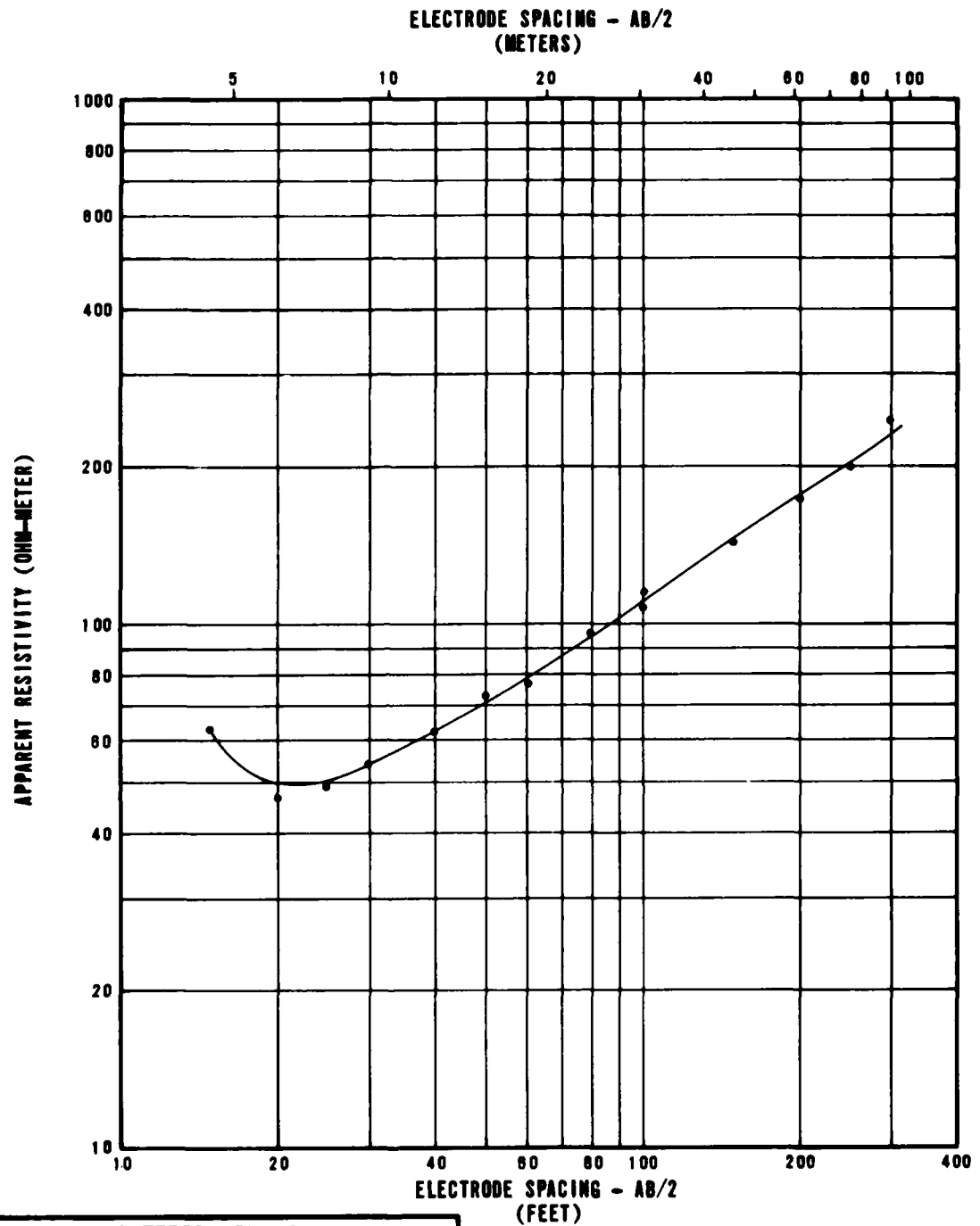
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	30
20	6	210
40	12	1590
57	17	240

RESISTIVITY SOUNDING SE-R-11
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMSO

FIGURE
4-11

FURRO NATIONAL, INC.



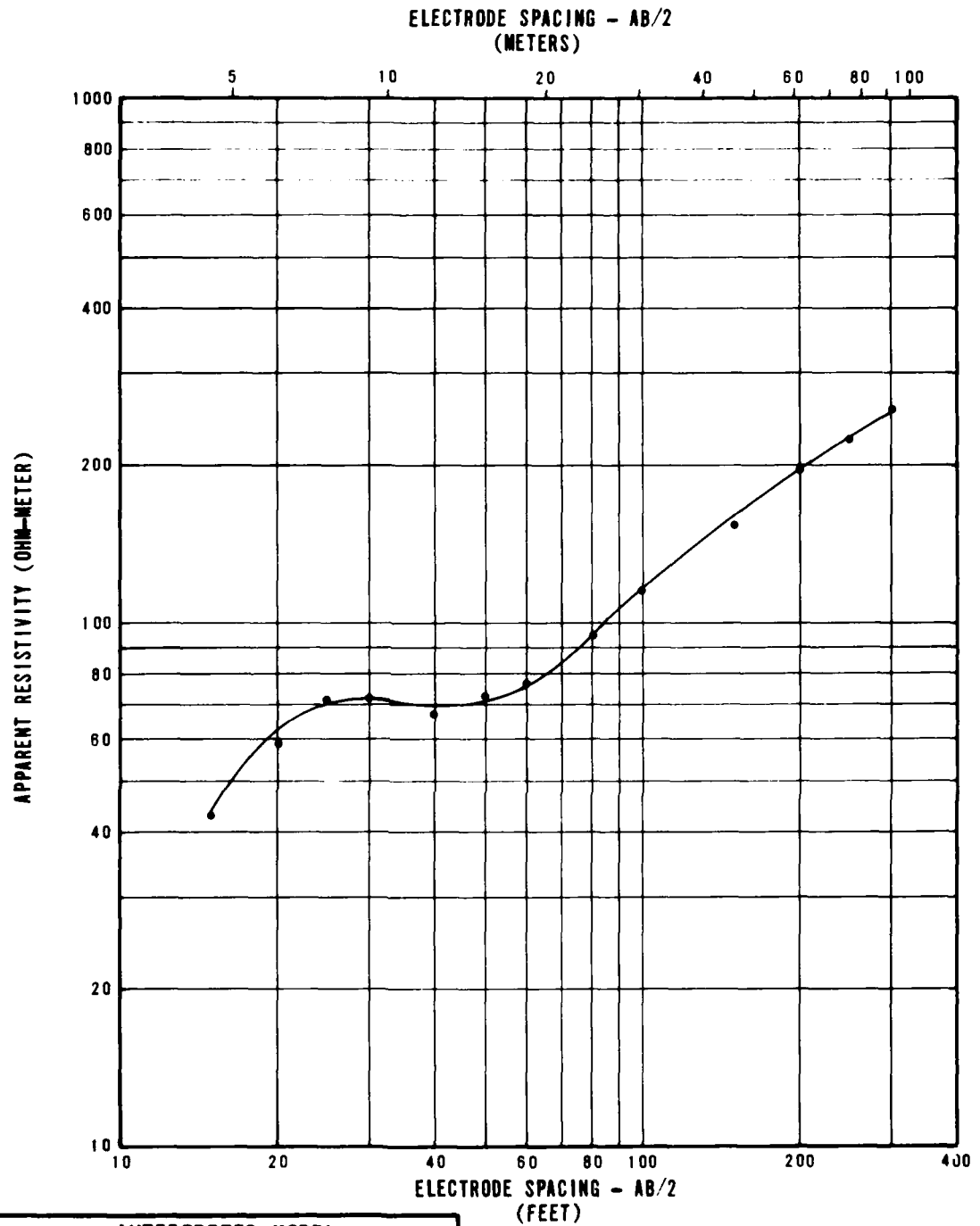
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	85
6	2	35
26	8	310
95	29	410

RESISTIVITY SOUNDING SE-R-12
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
4-12

FURRO NATIONAL INC.



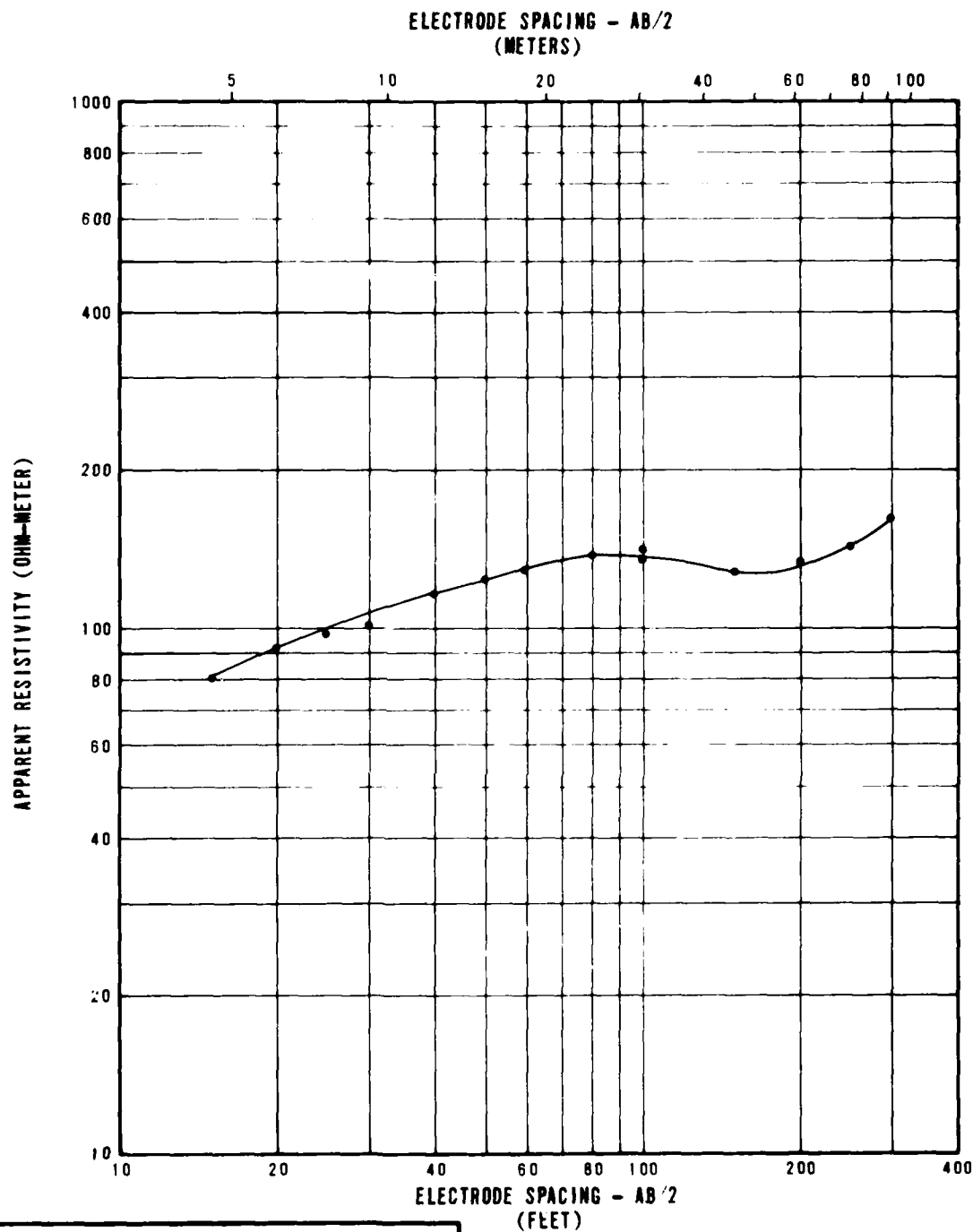
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	45
13	4	120
82	19	400
137	42	510

RESISTIVITY SOUNDING SE-R-14
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMS

FIGURE
4-13

FURRO NATIONAL INC.



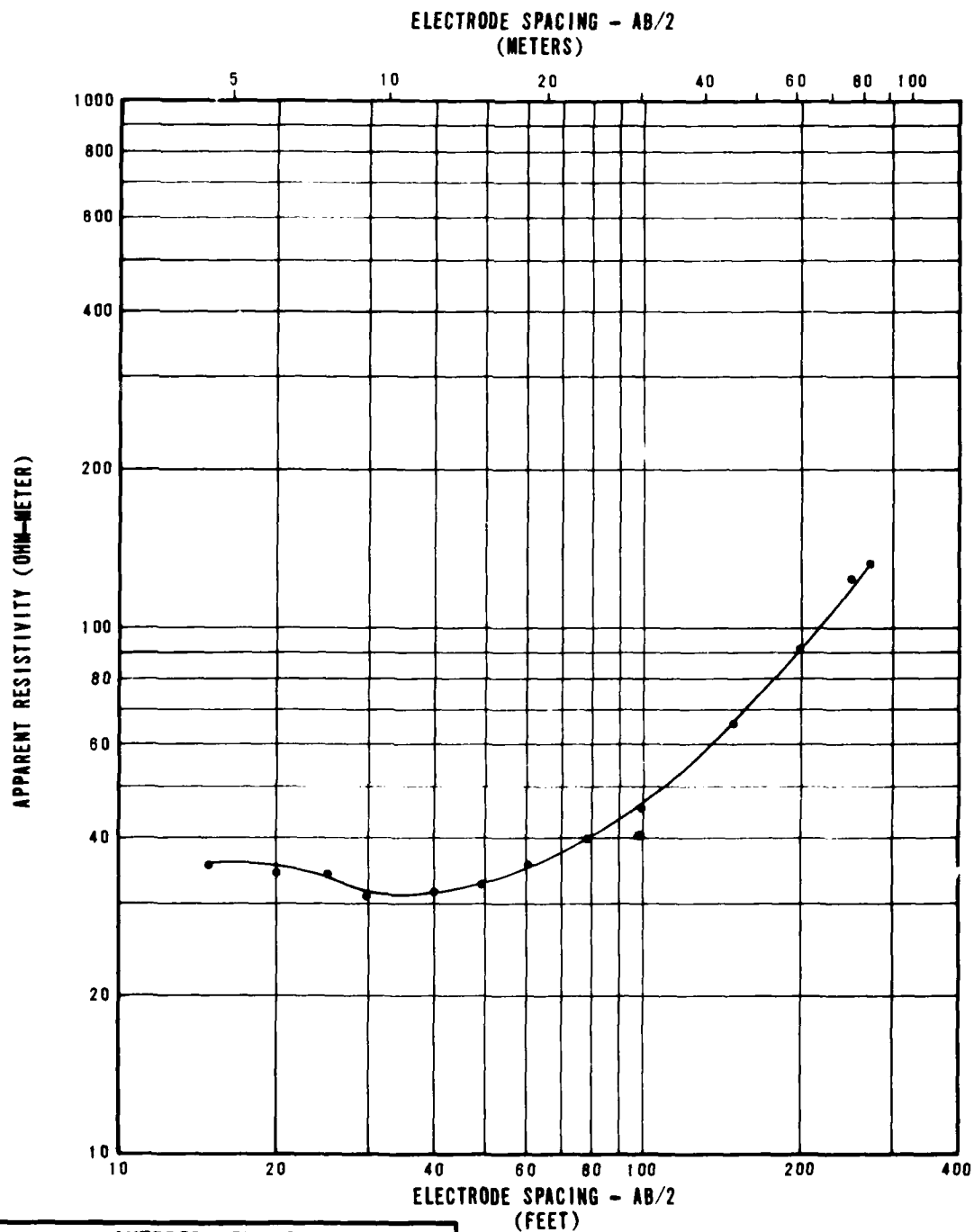
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	70
9	3	150
74	23	80
188	57	450

RESISTIVITY SOUNDING SE R-15
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMS0

FIGURE
4-1

VERRO NATIONAL INC.



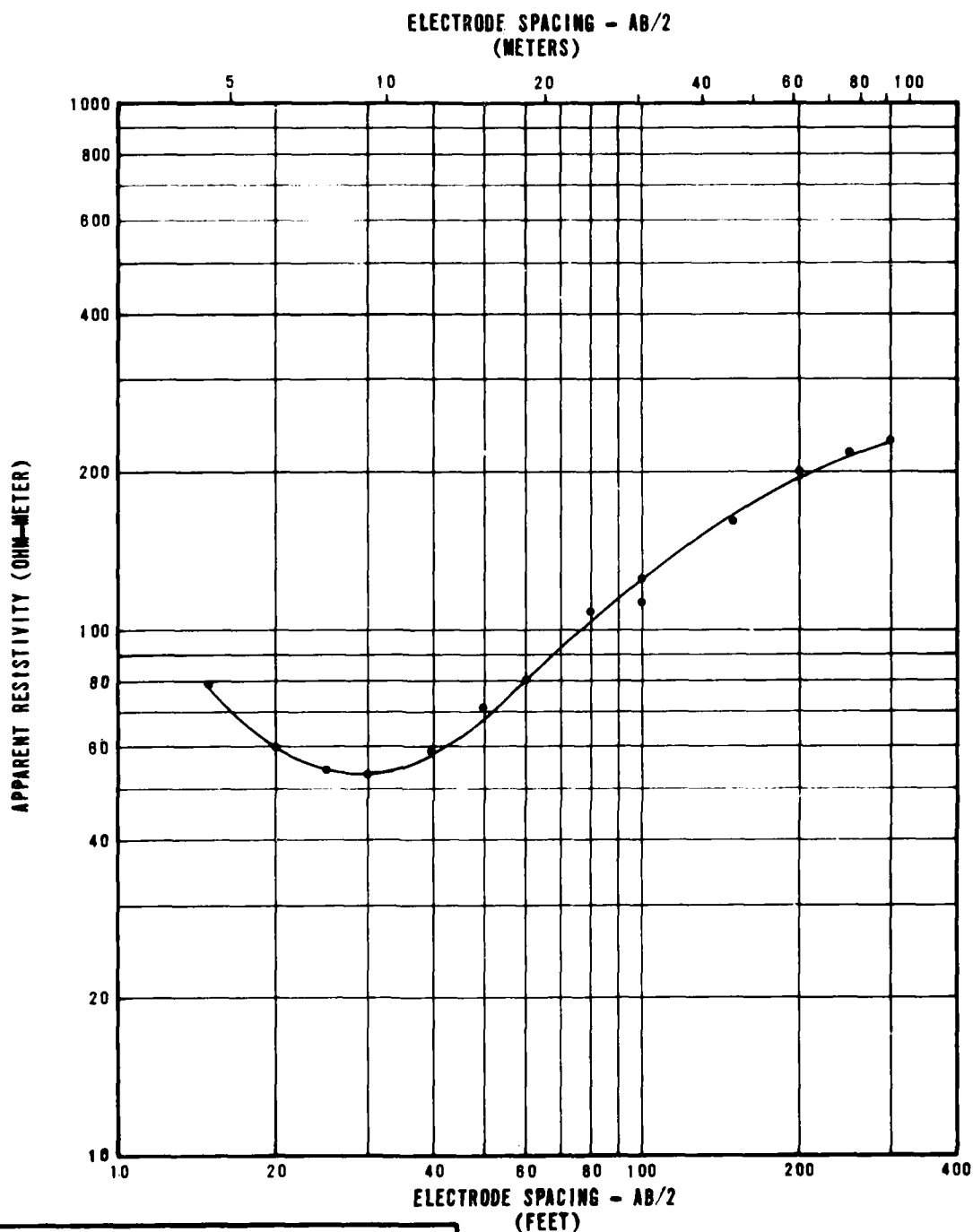
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	35
15	5	25
45	14	120
88	27	1180

RESISTIVITY SOUNDING SE-R-16
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
4-15

GUERO NATIONAL INC.



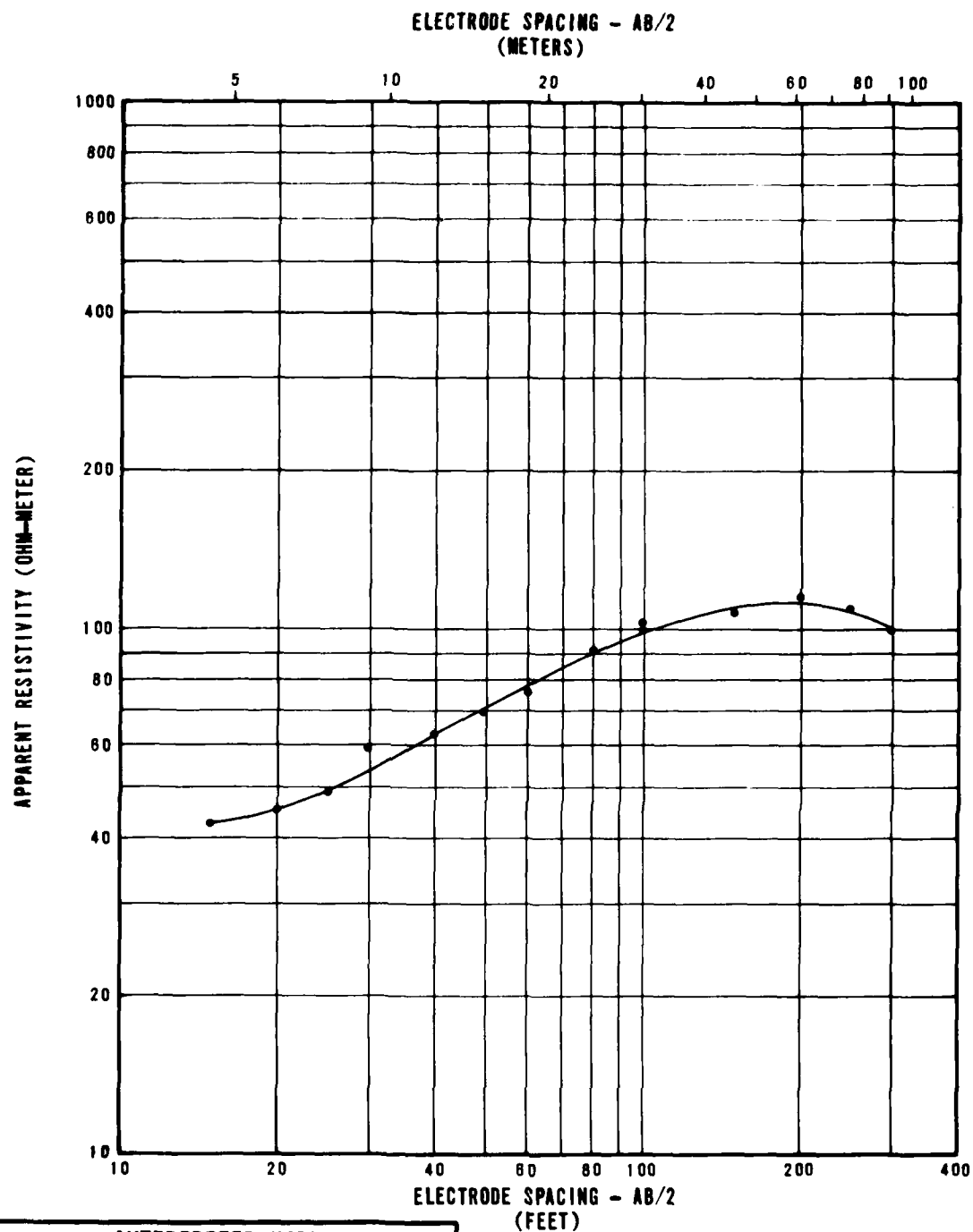
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	110
9	3	20
20	6	170
37	11	730
59	18	340

RESISTIVITY SOUNDING SE-R-17
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
4-16

FURRO NATIONAL INC.



INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	40
20	8	180
130	40	65

RESISTIVITY SOUNDING SE-R-18
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SANSO

FIGURE
4-17

VERO NATIONAL INC.

SECTION 5.0
GRAVITY DATA

EXPLANATIONS OF GRAVITY DATA

Gravity data were not available in time (prior to June 1979) for incorporation into this report. A supplemental report containing gravity data and results will be issued at a later date.

SECTION 6.0

BORING LOGS

EXPLANATIONS OF BORING, TRENCH, AND TEST PIT LOGS

All data from borings, trenches, and test pits are presented on standard Fugro National logs in Sections 6.0 and 7.0. The following explanations are provided as a key to the logs.

- A. Designations - Borings, trenches, and test pits are identified as follows:

WW-B-1

WW - abbreviation for the site (e.g., WW-Whirlwind)

B - abbreviation for activity (e.g., B-boring, T-trench, P-test pit)

1 - number of activity

- B. Sample Type - Different sampling techniques were used and the symbols are explained at the bottom of the boring logs. For details of sampling techniques, see Section A5.0 of Appendix in Volume I. Horizontal lines, to scale, indicate the depth where sampling was attempted.

- C. Percent Recovery - The numbers shown represent the ratio (in percent) of the soil sample recovered in the sampler to the full penetration of the sampler.

- D. N Value - Corresponds to standard penetration resistance, which is number of blows required to drive a standard split-spoon sampler for the second and third of three 6-inch (15 cm) increments with a 140-pound (63.5 kg) hammer falling 30 inches (76 cm) (ASTM D 1586-67).

- E. Depth - Corresponds to depth below ground surface in meters and feet.

- F. Lithology - Graphic representation of the soil and rock types.

- G. USCS - Unified Soil Classification System (see Table 6-1 for complete details) symbols.
- H. Soil Description - Except in cases where samples were classified based on laboratory test data, the descriptions are based on visual classification. The procedures outlined in ASTM D 2487-69, Classification of Soils for Engineering Purposes, and D 2488-69, Description of Soils (Visual-Manual Procedure) were followed. Solid lines across the column indicate known change in strata at the depth shown.

Definitions of some of the terms and criteria to describe soils and conditions encountered during the exploration follow.

Gradation : A coarse-grained soil is well graded if it has a wide range in grain size and substantial amounts of most intermediate particle sizes.

Poorly graded indicates that the soil consists predominantly of one size (uniformly graded) or has a wide range of sizes with some intermediate sizes obviously missing (gap-graded).

Moisture :	Dry	- no feel of moisture
	Slightly Moist	- much less than normal moisture
	Moist	- normal moisture for soil
	Very Moist	- much greater than normal moisture
	Wet	- for soils below the water table (if known)

Figure 1. Plasticity Chart for Laboratory Classification of Fine Grained Soils

FURRO NATIONAL, INC.

Consistency: Consistency descriptions of coarse-grained soils (GW, GP, GM, GC, SW, SP, SM, SC) are as follows.

<u>Consistency</u>	<u>N Value (ASTM D 1586-67)</u>
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	>50

Consistency descriptions of fine-grained soils (ML, CL, MH, CH,) are as follows:

<u>Consistency</u>	<u>Shear Strength</u> <u>(ksf) (kn/m²)</u>		<u>Field Guide</u>
Very Soft	0.25	12	Sample with height equal to twice the diameter, sags under own weight
Soft	0.25- 0.50	12 - 24	Can be squeezed between thumb and forefinger
Firm	0.50- 1.00	24- 48	Can be molded easily with fingers
Stiff	1.00- 2.00	48- 96	Can be imprinted with slight pressure from fingers
Very Stiff	2.00- 4.00	96- 192	Can be imprinted with considerable pressure from fingers
Hard	over 4.00	over 192	Cannot be imprinted by fingers

Grain Shape: Angular - particles have sharp edges and relatively plane sides with unpolished surfaces.

Subangular - particles are similar to angular but have somewhat rounded edges.

Subrounded - particles exhibit nearly plane sides but have well-rounded corners and edges.

Rounded - particles have smoothly curved sides and no edges.

Calcareous : Containing calcium carbonate; presence of calcium carbonate is commonly identified on the basis of reaction with dilute hydrochloric acid.

Caliche : Soils cemented by porous calcium carbonate and/or other soluble minerals by upward-moving solutions.

Degree of Cementation: (Stages of development of caliche profile)

Stage	Gravelly Soils	Nongravelly Soils
I	Thin, discontinuous pebble coatings	Few filaments or faint coatings
II	Continuous pebble coatings, some interpebble fillings	Few to abundant nodules, flakes, filaments
III	Many interpebble fillings	Many nodules and internodular fillings
IV	Laminar horizon overlying plugged horizon	Increasing carbonate impregnation

Secondary Material : Example - Sand with trace to some silt

Trace - 5-12% (by dry weight)
 Little - 13-20% (by dry weight)
 Some - >21% (by dry weight)

Plasticity : Plasticity index is the range of water content, expressed as a percentage of the weight of the oven-dried soil, through which the soil is plastic. It is defined as the liquid limit minus the plastic limit. Descriptive ranges used on the logs include:

Nonplastic	(PI, 0 - 4)
Slightly Plastic	(PI, 4 - 15)
Medium Plastic	(PI, 15 - 30)
Highly Plastic	(PI, >31)

Cobbles and
Boulders :

A cobble is a rock fragment, usually rounded by weathering or abrasion, with an average diameter ranging between 3 and 12 inches (8 and 30 cm).

A boulder is a rock fragment, usually rounded by weathering or abrasion, with an average diameter of 12 inches (30 cm) or more.

- I. Remarks - This column was provided on boring and trench logs for comments regarding drilling difficulty, number and size of cobbles or boulders encountered, trench wall stability, loss of drilling fluid in the boring, and other conditions encountered during drilling and excavations.
- J. Dry Density and Moisture Content - The boring logs include a graphical display of laboratory test results for dry density (ASTM D 2937-71) in pounds per cubic foot and kilograms per cubic meter and moisture content (ASTM D 2216-71) in percent from representative samples taken during drilling. The symbols are explained at the bottom of the boring logs.

K. Seive Analysis - The numbers represent the percentage by dry weight (ASTM D 422-63) of each of the following soil components:

GR - Gravel, rock particles that will pass a 3-inch (76 mm) sieve and are retained on No. 4 (4.75 mm) sieve.

SA - Sand, soil particles passing No. 4 sieve and retained on No. 200 (0.075 mm) sieve.

FI - Fines, silt or clay, soil particles passing No. 200 sieve.

L. Atterberg Limits (LL and PI) -

LL - Liquid Limit, the water content corresponding to the arbitrary limit between the liquid and plastic states of consistency of a soil (ASTM D 423-66).

PL - Plastic Limit, the water content corresponding to an arbitrary limit between the plastic and the semisolid state of consistency of a soil (ASTM D 424-59).

PI - Plasticity Index, numerical difference between the liquid limit (LL) and the plastic limit (PL) indicating the range of moisture content within which a soil-water mixture is plastic.

NP - Nonplastic.

M. Miscellaneous Information -

Elevations - indicated elevations on the logs are estimated from topographic maps of the study area, within an accuracy of half the contour interval.

Surficial
Geologic Unit - indicates the surficial geologic unit in which the activity is located.

Date Drilled - indicates the period from beginning to completion of the activity.











Drilling
Method - signifies the type of drilling procedure used such as rotary wash.

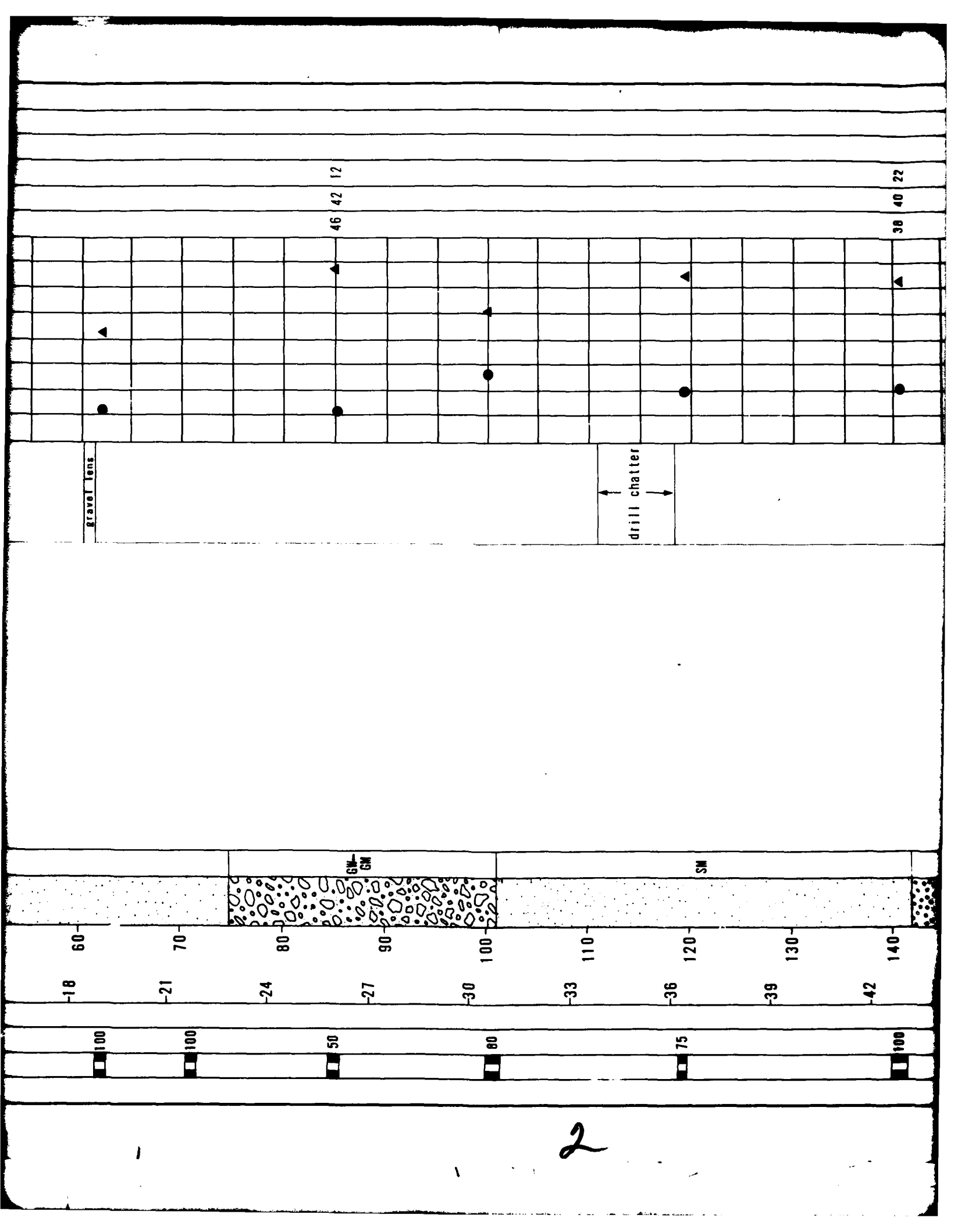
Hole Diameter - nominal size of boring drilled.

Water Level - indicates depth from ground surface to water table where encountered.

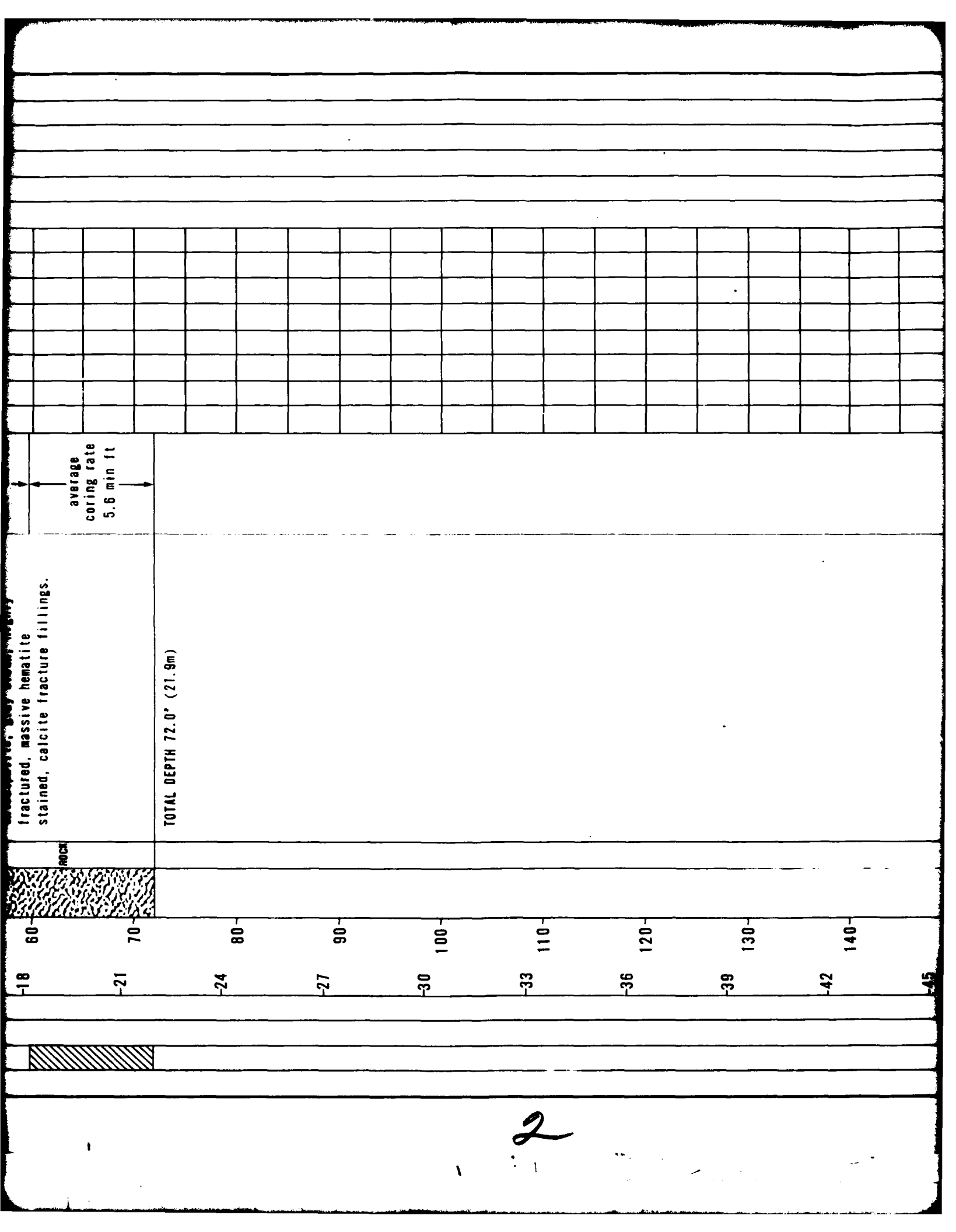
Trench Length - length at ground surface of final trench excavation.

Trench
Orientation - bearing of longitudinal trench centerline.

SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH METERS	DEPTH FEET	LITHOLOGY	USCS	SOIL DESCRIPTION	REMARKS	▲ (pcf)													SIEVE ANALYSIS		
									80	90	100	110	120	130	140	GR	SA	FI	LL	PI				
	86		0	0		SC-SM	CLAYEY SAND-SILTY SAND, brown, fine to coarse, poorly graded, loose, sub-angular, calcareous; little slightly plastic silt.		●		▲						4	75	21					
	80					GP-GM			●			▲					58	47	15	27	7			
	100								●				▲				47	45	8					
	67		3	10			Interbedded layers of GRAVEL and SAND: GRAVEL: SANDY GRAVEL (GP), SILTY GRAVEL (GM): brown, fine to coarse, poorly to well graded, dense to very dense, subangular to angular, calcareous; some sand; trace to little silt.		●			▲												
	90		6	20		SP-SM			●															
	100								●						▲		41	47	12					
	100		9	30					●															
	100																							
	80		12	40				drill chatter	●				▲											
	100		15	50		SM											29	53	18					



SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH METERS	DEPTH FEET	LITHOLOGY	USCS	SOIL DESCRIPTION	REMARKS	▲(pcf) ● (%)											SIEVE ANALYSIS					
									80	90	100	110	120	130	140	GR	SA	FI	LL	PI					
CLAYEY SILT	73	-6	3	10	SP	SM	GRAVELLY SAND, brown to black, fine to coarse, poorly to well graded, loose to medium dense, subrounded, calcareous, little to some fine to coarse subrounded gravel.	drill hole caving	●	●	▲						28	65	7					46	17
CLAYEY SILT	87	-9	6	20	ML	SM	CLAYEY SILT, light gray, firm to stiff, slightly to medium plastic, calcareous; trace fine sand.		●	●	▲						17	81	2					40	14
GRAVELLY SAND	100	-12	9	30	SM	SM	GRAVELLY SAND, brown, fine to coarse, well graded, dense, subangular to angular, calcareous; some fine to coarse subangular to angular gravel; little slightly plastic silt.		●	●	▲						31	51	18						
LIMESTONE	87	-15	12	40	SM	SM	LIMESTONE, sparite and brecciated intrasparite, gray brown, highly fractured, massive hematite	drill chatter	●	●	▲						35	51	14						



fractured, massive hematite
stained, calcite fracture fillings.

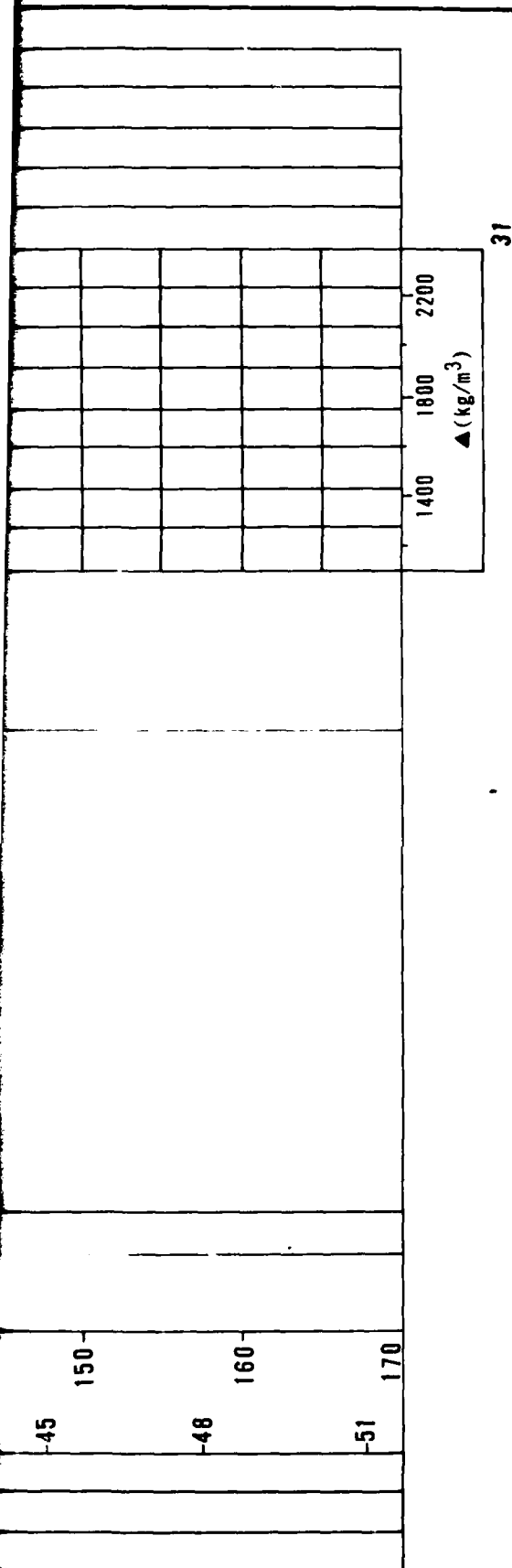
TOTAL DEPTH 72.0' (21.9m)

average
coring rate
5.6 min ft

ROCK

-18 60 -21 70 -24 80 -27 90 -30 100 -33 110 -36 120 -39 130 -42 140 -45

2



EXPLANATION

■ FUGRO DRIVE SAMPLE

□ BULK SAMPLE

■ PITCHER TUBE SAMPLE

■ STANDARD PENETRATION TEST SAMPLE

▨ CORE SAMPLE

N - STANDARD PENETRATION RESISTANCE

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 5030' (1533m)

SURFICIAL GEOLOGIC UNIT : A40

DATE DRILLED : 31 OCT-1 NOV 1978

DRILLING METHOD : Rotary Wash

HOLE DIAMETER : 4 7/8" (124mm)

WATER LEVEL : Not Encountered

LOG OF BORING SE-B-2
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMS0

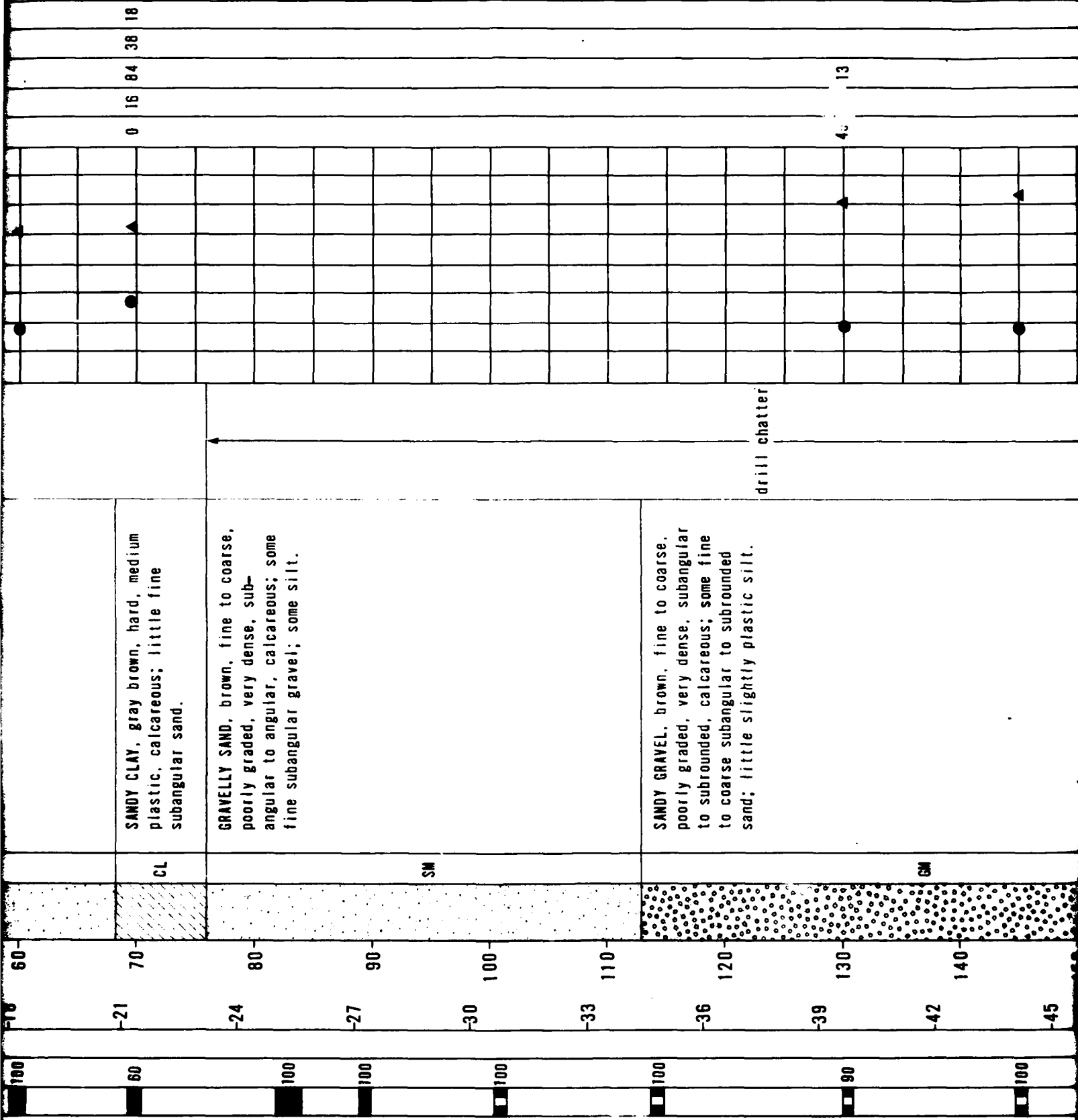
FIGURE

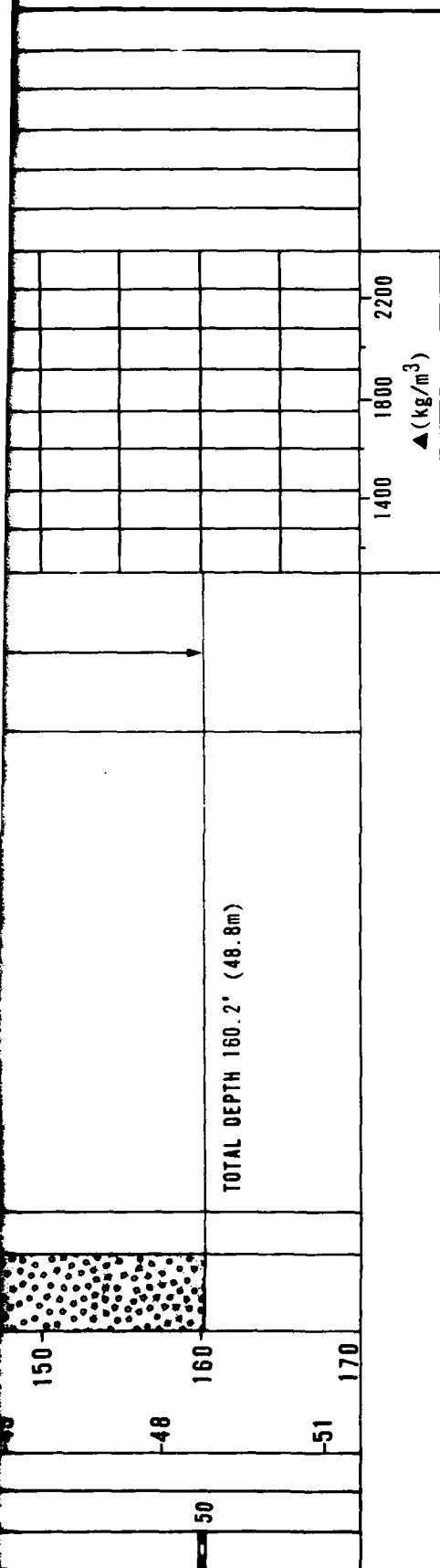
8-2

FUGRO NATIONAL, INC.

AFV-08

SAMPLE TYPE	% RECOVERY	N VALUE	METERS	DEPTH FEET	LITHOLOGY	USCS	SOIL DESCRIPTION	REMARKS
■	100	-	0	0	SM	SM	SILTY SAND, brown, fine to medium, poorly graded, medium dense, sub-angular, calcareous; some silt; layer of sandy silt (2.0'-5.6').	
■	93	-			ML	ML		cobbles to 6" size
■	100	-	3	10	SM	SM		
■	100	-					GRAVELLY SAND, brown, fine to coarse, well graded, dense to very dense, subangular to subrounded, calcareous; some fine to coarse subangular gravel; trace silt.	
■	100	-	6	20	SW-SM	SW-SM		
■	90	-	9	30	GP-GM	GP-GM	SANDY GRAVEL, brown, fine to coarse, poorly graded, very dense, sub-angular to angular, calcareous; some subangular to angular sand; trace silt.	
■	90	-						
■	100	-	12	40			SILTY SAND, yellow brown, fine to coarse, poorly graded, dense to very dense, subangular, calcareous; some silt; little fine subrounded gravel; lenses of gravely sand and sandy gravel throughout.	irregular drift chatter
■	100	-	15	50	SM	SM		
■	100	-	18	60				





EXPLANATION

■ FUGRO DRIVE SAMPLE

□ BULK SAMPLE

■ PITCHER TUBE SAMPLE

□ STANDARD PENETRATION TEST SAMPLE

▨ CORE SAMPLE

N - STANDARD PENETRATION RESISTANCE

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 5086' (1550m)

SURFICIAL GEOLOGIC UNIT : A5i

DATE DRILLED : 2-3 November 1978

DRILLING METHOD : Rotary Wash

HOLE DIAMETER : 4 7/8" (124mm)

WATER LEVEL : Not Encountered

LOG OF BORING SE-8-3
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMSU

FIGURE

8-3

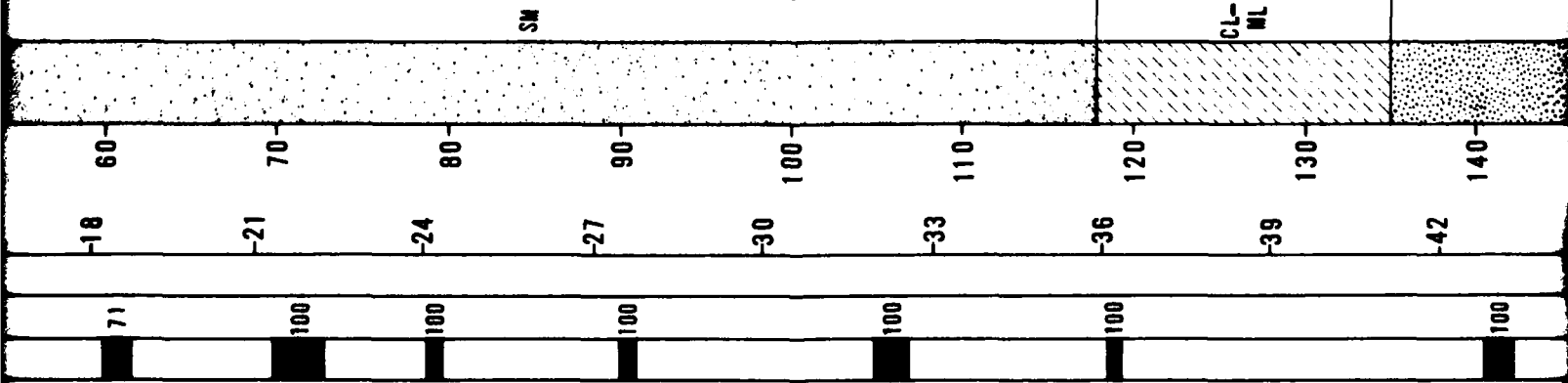
FUGRO NATIONAL, INC.

APV-08

CHECKED BY _____ APPROVED BY _____

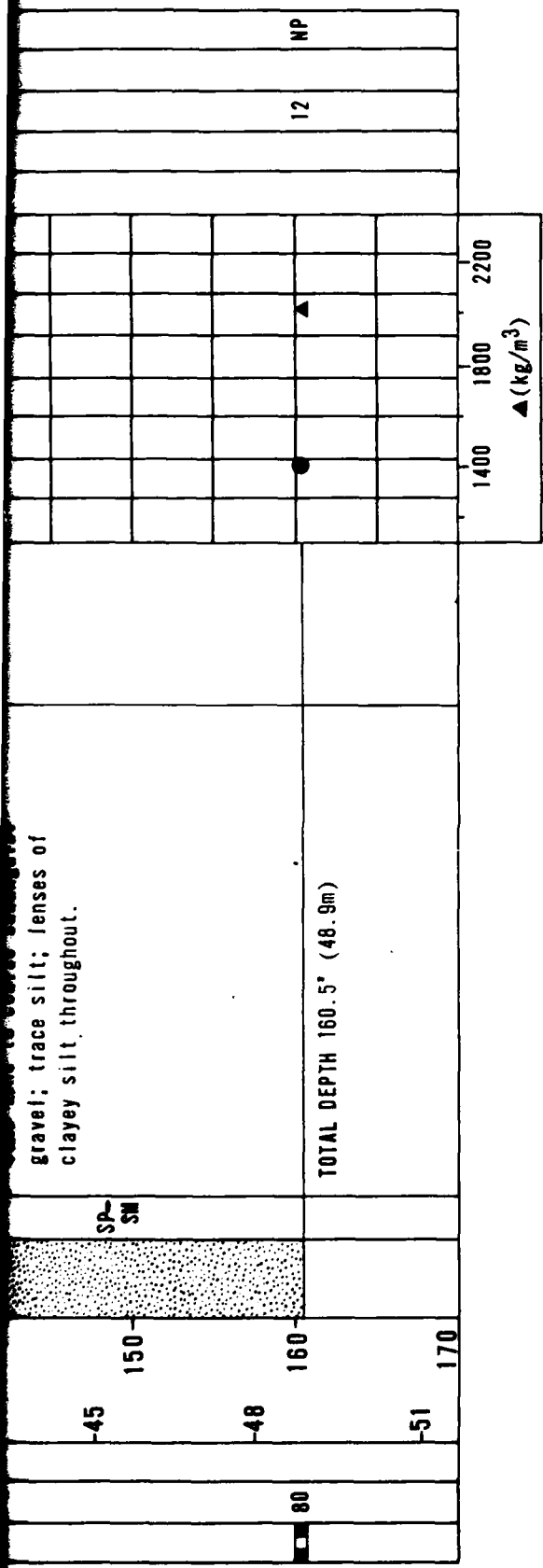
SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH METERS	DEPTH FEET	LITHOLOGY	USCS	SOIL DESCRIPTION	REMARKS	▲(pcf)											SIEVE ANALYSIS				
									80	90	100	110	120	130	140	GR	SA	FI	LL	PI				
	75		0	0			GRAVELLY SAND and SILTY SAND, yellow brown, fine to coarse, poorly graded, loose to medium dense, subangular to subrounded, calcareous; some silt; trace to some fine subangular gravel.		●	▲							25	47	28					
	92					SM			●	▲							4	59	37					
	73		- 3	10					●	▲														
	80					CL-ML	SILTY CLAY-CLAYEY SILT, brown, firm, slightly plastic, calcareous.		▲	▲	●	●									33	9		
	90		- 6	20		SP-SM	GRAVELLY SAND and SILTY SAND, yellow brown, fine to coarse, poorly graded, medium dense to dense, subangular to subrounded, calcareous; trace to some fine subangular gravel; trace to some silt.			●	▲													
	100					SM				●							6	60	34					
	100		- 9	30		CL-ML	SILTY CLAY-CLAYEY SILT, yellow brown, stiff, slightly plastic, calcareous; trace fine sand.		▲	▲	●	●					0	6	94	27	6			
	100		- 12	40			SANDY SILT, yellow-brown, stiff, non-plastic, calcareous; some fine to medium subrounded sand; lenses of gravelly sand throughout.																	
	100		- 15	50		ML											0	41	59					
	100		- 18	60			SILTY SAND, brown, fine to coarse, poorly graded, dense, subrounded, calcareous; some nonplastic silt; trace fine gravel; lenses of gravelly sand and clayey silt.		●	▲	▲	▲					5	51	44					

poorly graded, dense, subrounded, calcareous; some nonplastic silt; trace fine gravel; lenses of gravelly sand and clayey silt throughout.



2

gravel; trace silt; lenses of clayey silt throughout.



EXPLANATION

- FUGRO DRIVE SAMPLE
- ▨ BULK SAMPLE
- PITCHER TUBE SAMPLE
- STANDARD PENETRATION TEST SAMPLE
- ▨ CORE SAMPLE
- N - STANDARD PENETRATION RESISTANCE
- ▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)
- - MOISTURE CONTENT (ASTM: D-2216-71)
- NR - NO RECOVERY

BORING DETAILS

ELEVATION : 5070' (1545m)
 SURFICIAL GEOLOGIC UNIT : A40
 DATE DRILLED : 3-4 November
 DRILLING METHOD : Rotary Wash
 HOLE DIAMETER : 4 7/8" (124mm)
 WATER LEVEL : Not Encountered

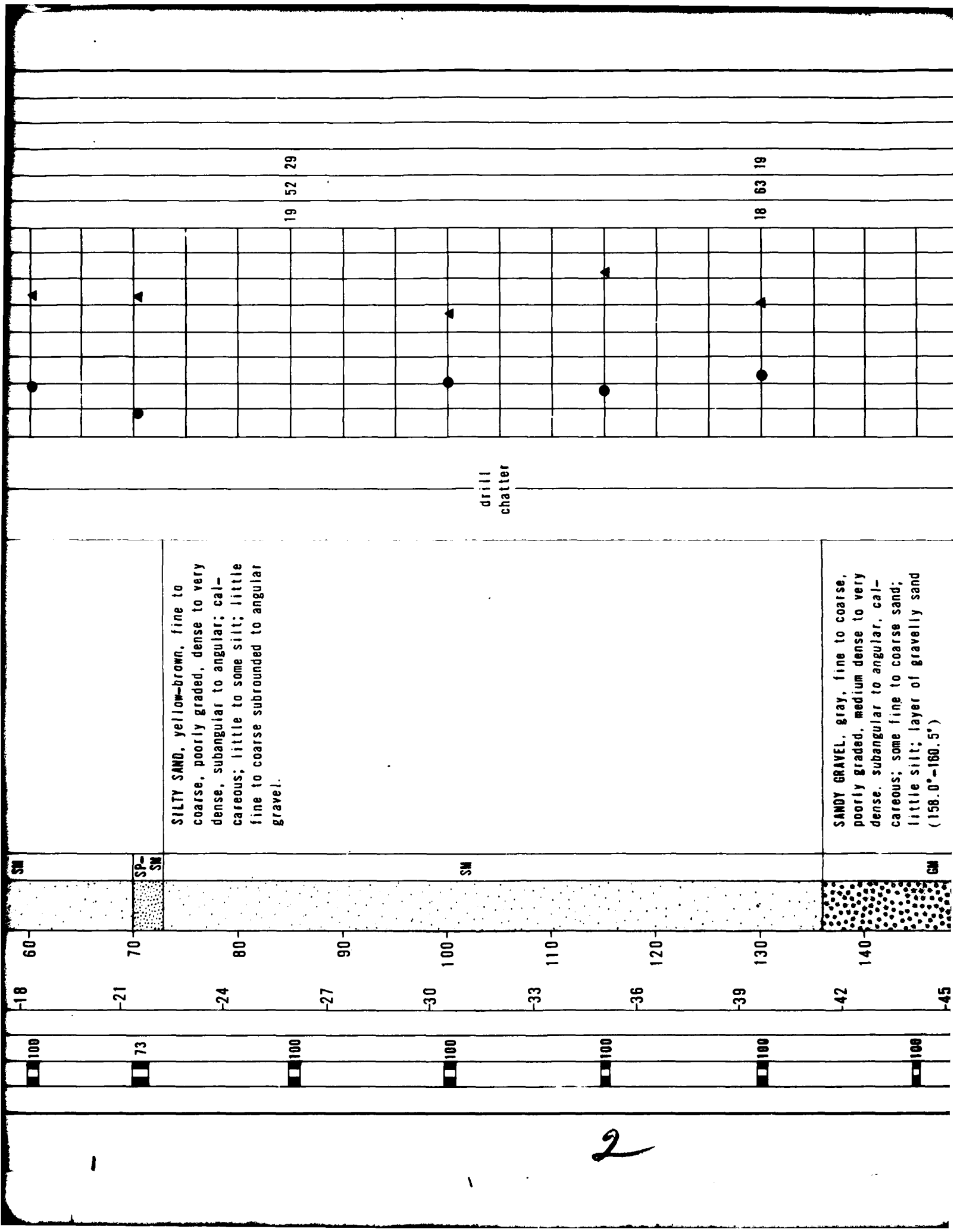
LOG OF BORING SE-B-4 VERIFICATION SITE, SNAKE EAST CDP, UTAH

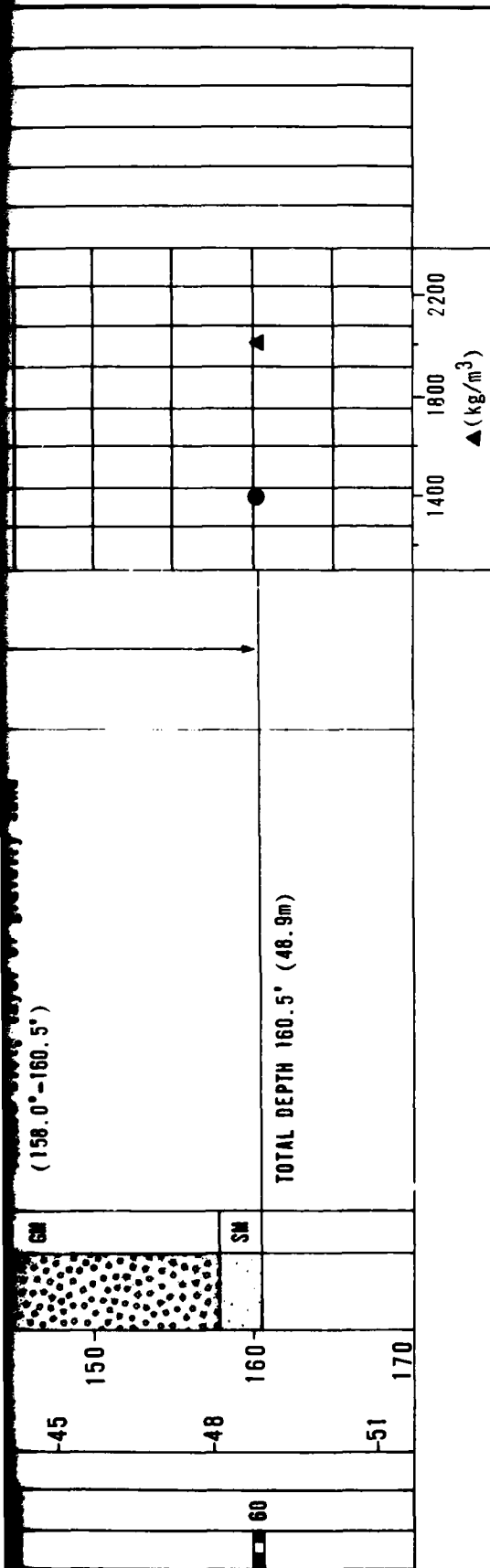
MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
 6-4

FUGRO NATIONAL, INC.

SAMPLE TYPE	% RECOVERY	N VALUE	METERS	DEPTH FEET	LITHOLOGY	USCS	SOIL DESCRIPTION	REMARKS
■	73		0	0	GM	GM	SANDY GRAVEL, gray brown, fine to coarse, poorly to well graded, medium dense to very dense, sub-angular to subrounded, calcareous; some fine to coarse subangular sand; trace to little silt; occasional cobbles to 6" size.	
■	73				GP-GM	GP-GM		
■	100		3	10				drill chatter
■	90		6	20			GRAVELLY SAND; gray brown, fine to coarse, poorly graded, very dense subrounded to angular, calcareous; some fine to coarse subrounded to angular gravel; trace to little silt.	
■	100		9	30		SP-SM		
■	57		12	40				
■	100		15	50				
■	100		18	60		SM		





EXPLANATION

- FUGRO DRIVE SAMPLE
- BULK SAMPLE
- PITCHER TUBE SAMPLE
- STANDARD PENETRATION TEST SAMPLE
- ▨ CORE SAMPLE
- N - STANDARD PENETRATION RESISTANCE
- ▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)
- - MOISTURE CONTENT (ASTM: D-2216-71)
- NR - NO RECOVERY

BORING DETAILS

ELEVATION : 5475' (1669m)
 SURFICIAL GEOLOGIC UNIT : A5i
 DATE DRILLED : 4-5 November 1976
 DRILLING METHOD : Rotary Wash
 HOLE DIAMETER : 4 7/8" (124mm)
 WATER LEVEL : Not Encountered

LOG OF BORING SE-B-5
 VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE SAMSU

FIGURE
 8-5

FUGRO NATIONAL, INC.

AFV-08

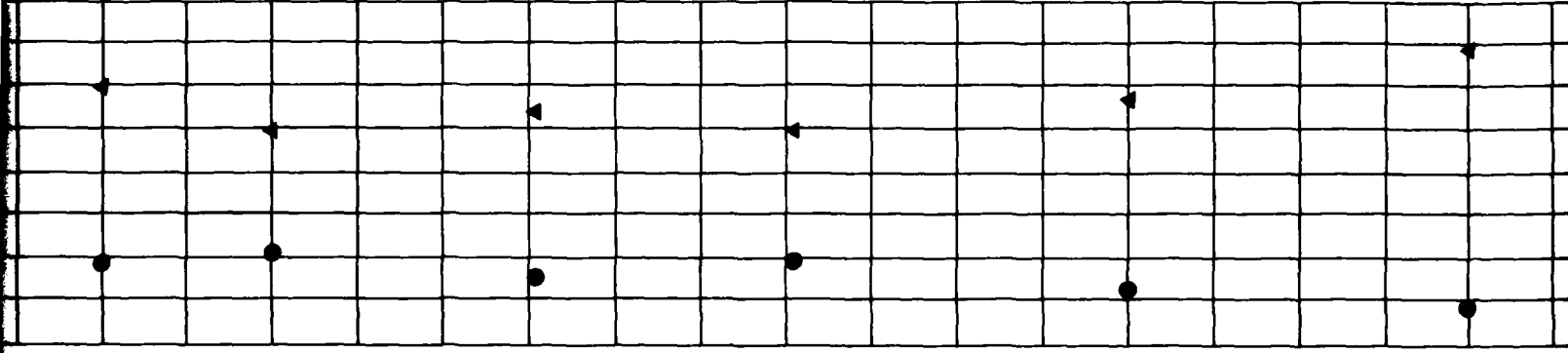
3

CHEMICAL BY _____ ANALYSED BY _____

2 JUL 78

SAMPLE TYPE	% RECOVERY	N VALUE	METERS	FEET	LITHOLOGY	USCS	SOIL DESCRIPTION	REMARKS	▲(pcf)													SIEVE ANALYSIS		
									80	90	100	110	120	130	140	GR	SA	FI	LL	PI				
	73		0	0		GM	Interbedded layers of GRAVEL and SAND:	drill hole caving	●		▲						49	28	23					
	80						GRAVEL:		●			▲					21	59	20					
	67						SILTY GRAVEL (GM); brown, fine to coarse, poorly graded, medium dense to very dense, sub-rounded to subangular, calcareous; some fine to coarse sand; trace to little silt.	drill chatter 6" cobble	●			▲												
	67		3	10		SM			●															
	100								●								25	61	14					
	100		6	20		SP	SAND:		●															
	90						GRAVELLY SAND (SP, SM); brown, fine to coarse, poorly graded, dense to very dense, subrounded to angular, calcareous; some fine to coarse gravel; trace to little silt.		●								45	42	13					
	90		9	30		GM			●															
	90		12	40					●															
	90		15	50		SM			●								26	53	21					

27 57 16



GM

SM

60

70

80

90

100

110

120

130

140

-18

-21

-24

-27

-30

-33

-36

-39

-42

80

90

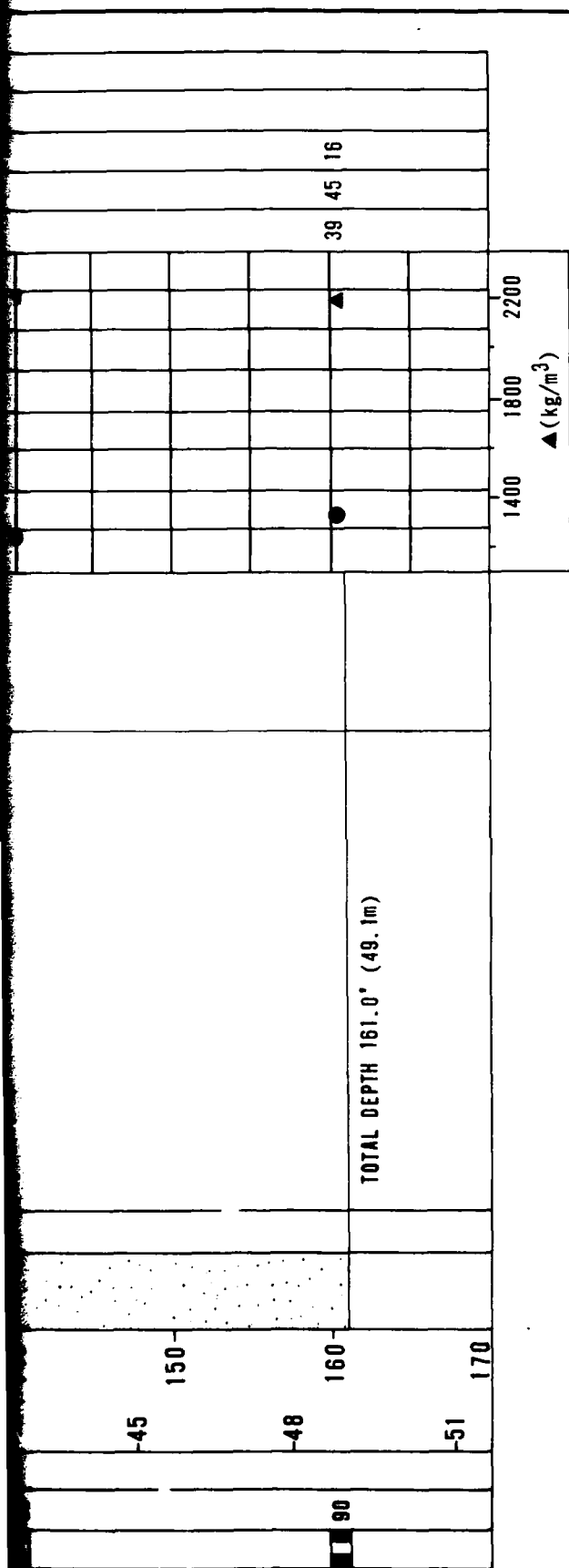
100

100

100

90

23



LOG OF BORING SE-B-6 VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMS

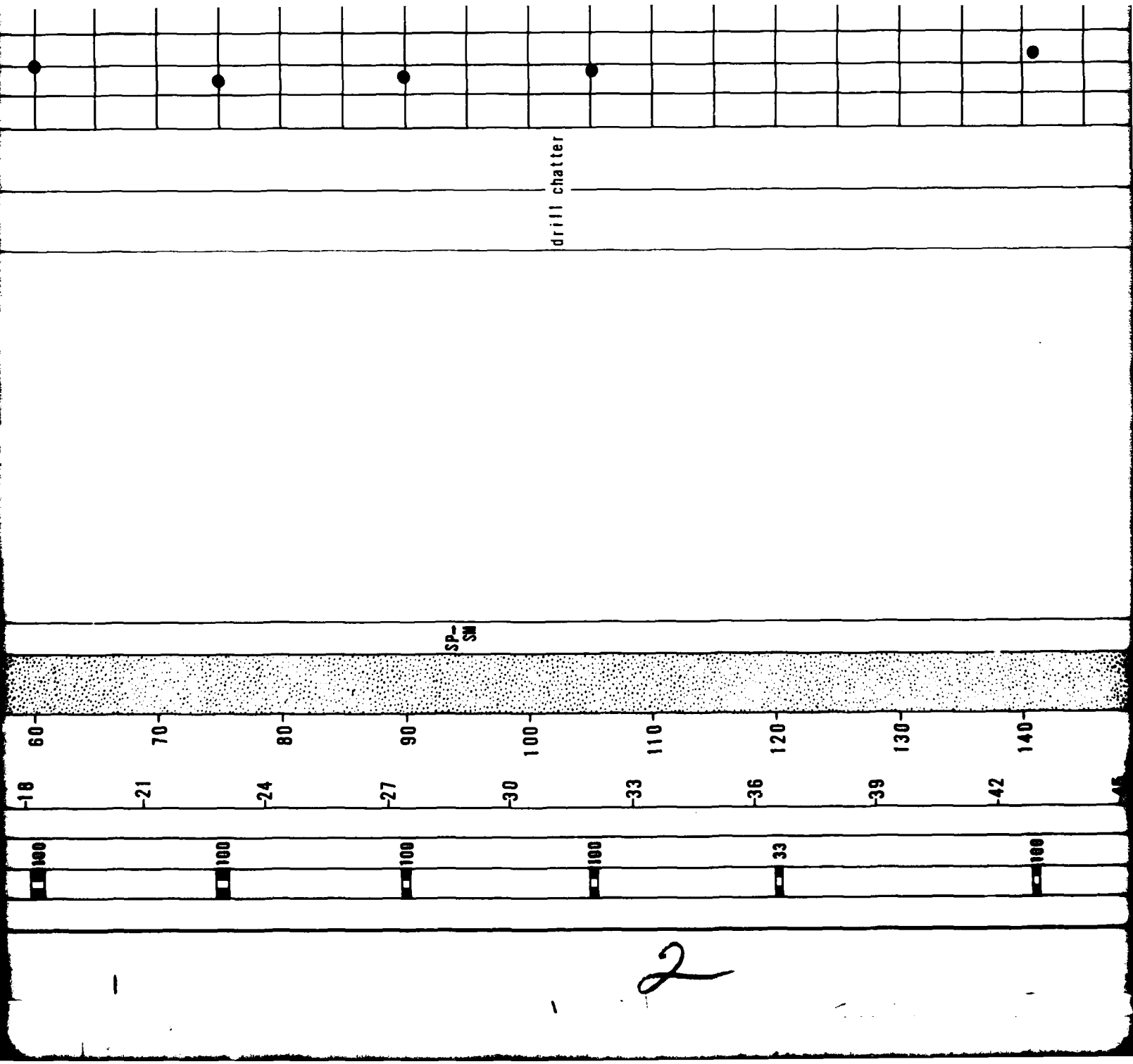
FIGURE
6-6

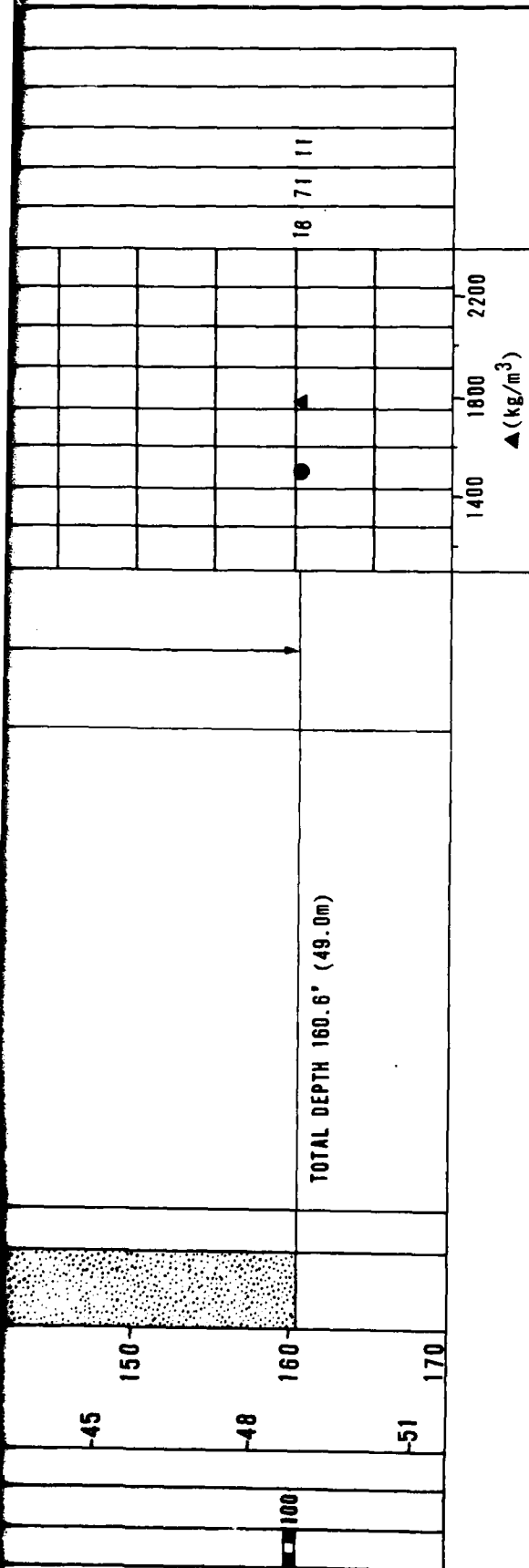
FUGRO NATIONAL, INC.

AFV-06

CHECKED BY _____ APPROVED BY _____

SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH METERS	DEPTH FEET	LITHOLOGY	USCS	SOIL DESCRIPTION	REMARKS	▲(pcf) ●(%)													SIEVE ANALYSIS			
									80	90	100	110	120	130	140	GR	SA	FI	LL	PI					
■	93		0	0	SM	SM	GRAVELLY SAND, brown, fine to coarse, poorly to well graded, medium dense to very dense, subrounded to angular, calcareous; some fine to coarse subrounded to subangular gravel; trace silt; layers of silty sand (0.0'-2.0' and 23.0-28.0').	occasional cobbles to 6" size	●	▲							24	46	30						
■	100				SP-SM	SP-SM			●				▲						21	65	14				
■	100								●				▲						42	49	9				
■	100		3	10					●				▲						24	66	10				
■	90								●				▲												
■	100		6	20					●				▲												
■	100					SM			●				▲				11	54	35						
■	100		9	30					●				▲												
■	100		12	40					●				▲												
■	100		15	50					●				▲				28	66	6						





EXPLANATION

■ FUGRO DRIVE SAMPLE

□ BULK SAMPLE

■ PITCHER TUBE SAMPLE

□ STANDARD PENETRATION TEST SAMPLE

▨ CORE SAMPLE

N - STANDARD PENETRATION RESISTANCE

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 5200' (1585m)

SURFICIAL GEOLOGIC UNIT : A5i

DATE DRILLED : 6-7 November 1978

DRILLING METHOD : Rotary Wash

HOLE DIAMETER : 4 3/4" (121mm)

WATER LEVEL : Not Encountered

LOG OF BORING SE-B-7
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
8-7

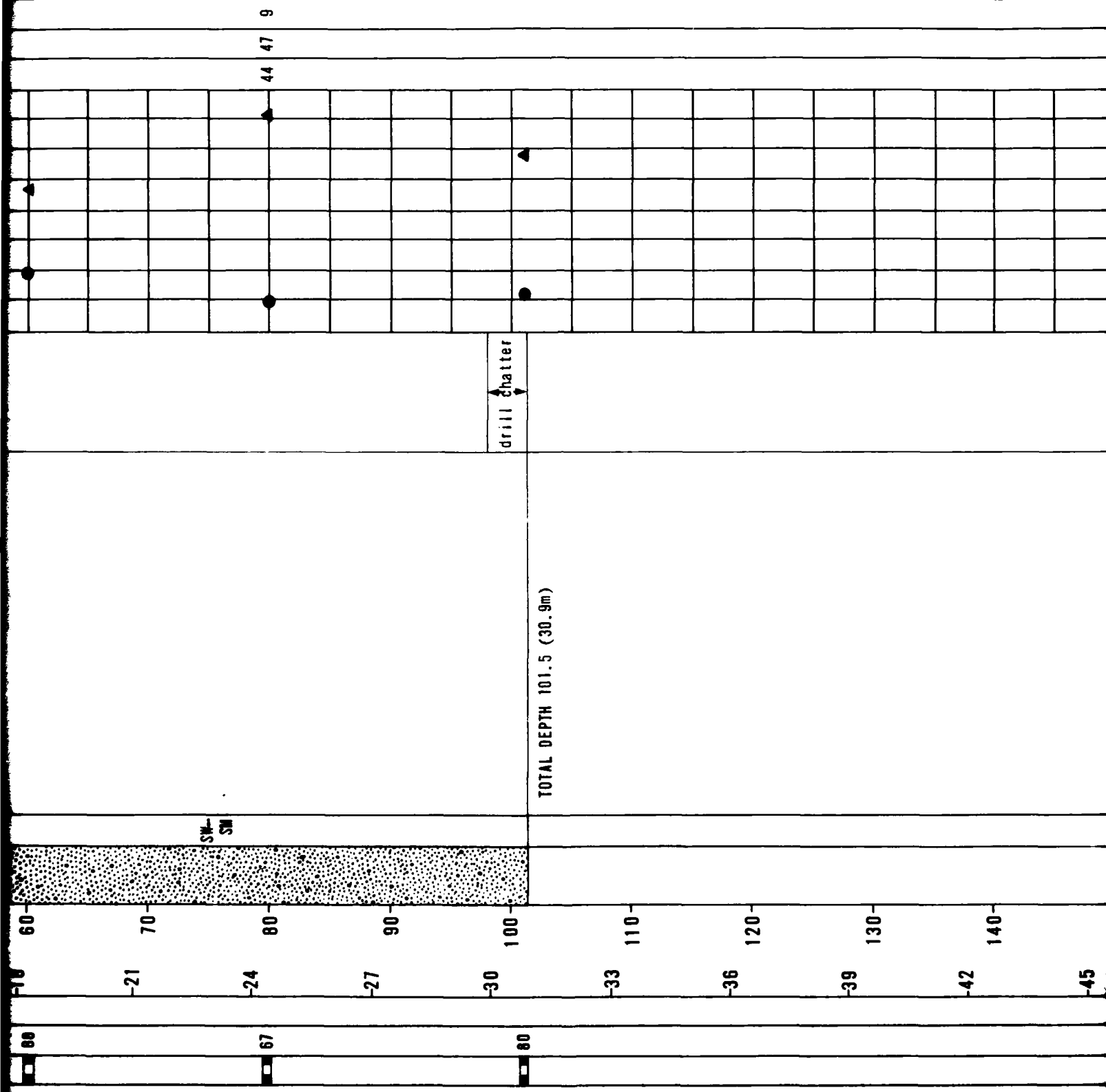
FUGRO NATIONAL INC.

AFV-06

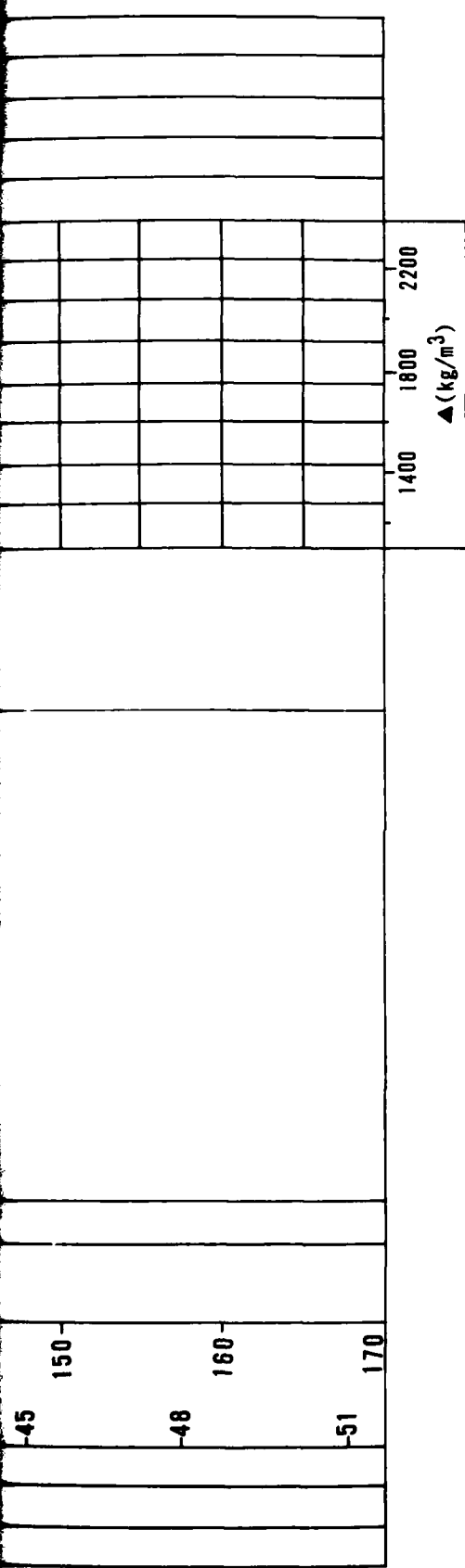
CHECKED BY _____ APPROVED BY _____

SAMPLE TYPE	% RECOVERY	N VALUE	METERS	DEPTH FEET	LITHOLOGY	USCS	SOIL DESCRIPTION	REMARKS	▲(pcf)													SIEVE ANALYSIS			
									80	90	100	110	120	130	140	GR	SA	FI	LL	PI					
	88		0	0		SM	SILTY SAND, brown, fine to coarse, poorly graded, loose, subrounded, calcareous; some silt; trace fine sub-rounded gravel.		●									10	47	43					
	100					GM			●			▲						47	37	16					
	100		-3	10			Interbedded layers of GRAVEL and SAND:		●				▲												
	90						GRAVEL: SANDY GRAVEL (GW).		●			▲													
	100		-6	20		SP-SM	SILTY GRAVEL (GM): brown, fine to coarse, well graded, dense to very dense, subrounded to angular, calcareous; some fine to coarse sand; trace to little silt.		●				▲												
	90						SAND: GRAVELLY SAND (SW, SM): brown, fine to coarse, poorly to well graded, dense to very dense, subrounded to angular, calcareous; some fine to coarse gravel; trace silt.		●				▲					18	71	11					
	100		-9	30					●					▲											
			-12	40		GM-GM																			
	100		-15	50					●							▲		54	40	6					

↑ cobbles to 6" size ↓



2



EXPLANATION

- FUGRO DRIVE SAMPLE
- BULK SAMPLE
- PITCHER TUBE SAMPLE
- STANDARD PENETRATION TEST SAMPLE
- ▨ CORE SAMPLE
- N - STANDARD PENETRATION RESISTANCE
- ▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)
- - MOISTURE CONTENT (ASTM: D-2216-71)
- NR - NO RECOVERY

BORING DETAILS

ELEVATION : 5202' (1586m)
 SURFICIAL GEOLOGIC UNIT : A5y
 DATE DRILLED : 7-8 November 1978
 DRILLING METHOD : Rotary Wash
 HOLE DIAMETER : 4 3/4" (121mm)
 WATER LEVEL : Not Encountered

LOG OF BORING SE-B-8 VERIFICATION SITE, SNAKE EAST CDP, UTAH	
MX SITING INVESTIGATION DEPARTMENT OF THE AIR FORCE SAMS0	FIGURE B-8
FUGRO NATIONAL, INC.	

3

SECTION 7.0

TRENCH AND TEST PIT LOGS

EXPLANATIONS OF TRENCH AND TEST PIT LOGS

See Section 6.0, "Boring Logs", for explanations.

BULK SAMPLE	DEPTH		LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
	METERS	FEET						GR	SA	FI	LL	PI
	0	0		SM	loose	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some silt; trace fine gravel.	vertical walls sloughing	8	65	27		NP
	2			GP-GM	medium dense to dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some fine to coarse sand; trace silt; interbedded lenses of gravelly sand; stage I caliche to 9.0', stage II caliche (9.0'-12.0').	vertical walls stable					
	1											
	4											
	6											
	2											
	8											
	3											
	10											
	12											
	4											
	14					TOTAL DEPTH 13.5' (4.1m)						
	5											
	16											
	18											
	6											
	20											

TRENCH DETAILS

SURFACE ELEVATION : 5115' (1559m)
 DATE EXCAVATED : 31 OCTOBER 1978
 SURFICIAL GEOLOGIC UNIT : A5y, A4o
 TRENCH LENGTH : 14.8' (4.5m)
 TRENCH ORIENTATION : NW - SE

LOG OF TRENCH SE-T-1 VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE SAMS0

FIGURE
 7-1

FURRO NATIONAL INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0		CL-ML	stiff	SANDY CLAY-SANDY SILT, brown, slightly moist, slightly plastic, calcareous; some fine sand	vertical walls sloughing	4	36	60	23	5
	2		SP	medium dense	GRAVELLY SAND, brown, fine to coarse, poorly graded, dry, subangular to sub-rounded, calcareous; little gravel; intermittent lenses of sandy gravel; stage I caliche (4.0'-5.0').						
	4										
	6										
	8		GP	dense	SANDY GRAVEL, gray, fine to coarse, poorly graded, slightly moist, sub-angular to subrounded, calcareous; some coarse sand; stage I caliche.	vertical walls caving	66	34	0		
	10										
	12				TOTAL DEPTH 11.0' (3.4m)	terminated due to unstable vertical walls					
	14										
	16										
	18										
	20										

TRENCH DETAILS

SURFACE ELEVATION : 5030' (1533m)
 DATE EXCAVATED : 1 NOVEMBER 1978
 SURFICIAL GEOLOGIC UNIT : A4a
 TRENCH LENGTH : 12.5' (3.8m)
 TRENCH ORIENTATION : W-E

LOG OF TRENCH SE-T-2
 VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE SAMS0

FIGURE
 7-2

FUGRO NATIONAL, INC.

AD-A113 325

FUGRO NATIONAL INC LONG BEACH CA
MX SITING INVESTIGATION. GEOTECHNICAL EVALUATION. VOLUME III. N--ETC(U)
AUG 79
FN-TR-27-VOL-3

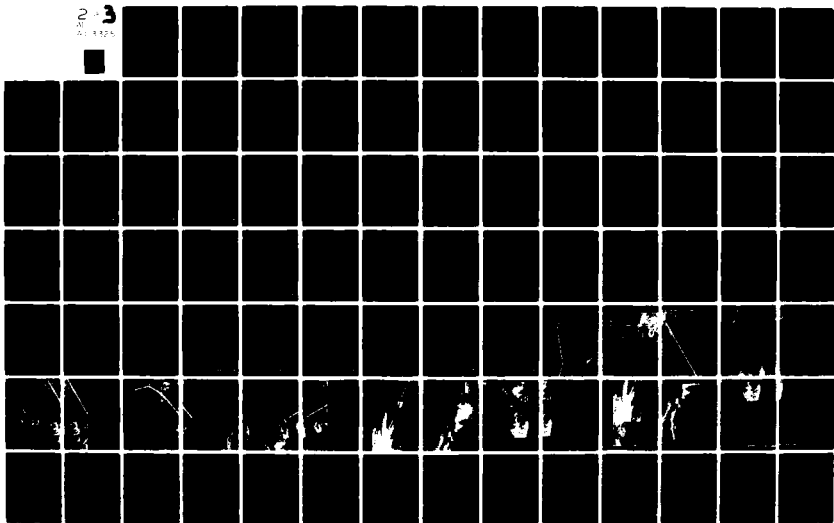
F/8 8/13

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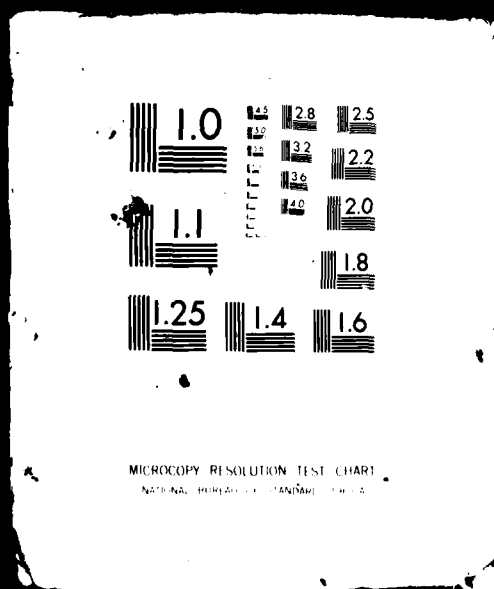
2-3
AD-A113 325

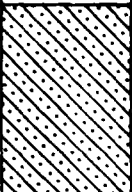



2 OF 3

AD-

A113325



BULK SAMPLE	DEPTH		LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
	METERS	FEET						GR	SA	FI	LL	PI
	0	0		SC-SM	medium dense	CLAYEY SAND-SILTY SAND, light brown, fine to medium, poorly graded, slightly moist, subangular to subrounded, calcareous; some slightly plastic silt; lenses of sand and silty clay throughout.	↑			33	28	7
	2											
	1	4		GM	medium dense	SANDY GRAVEL, brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some fine to coarse sand; little silt; occasional cobbles to 5" size (6.0'-14.0'); stage I caliche.	vertical walls stable					
	2	6										
	3	10			dense							
	4	12			medium dense							
	14					TOTAL DEPTH 14.0' (4.3m)	↓					
	5	16										
	6	20										

TRENCH DETAILS

SURFACE ELEVATION : 5088' (1550m)
 DATE EXCAVATED : 3 NOVEMBER 1978
 SURFICIAL GEOLOGIC UNIT: A51
 TRENCH LENGTH : 14.0' (4.3m)
 TRENCH ORIENTATION : N-S

LOG OF TRENCH SE-T-3
 VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
 7-3

FLURO NATIONAL INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0		SM	loose	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; some silt; little fine gravel.		19	34	47	21	3
	2			medium dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; little fine to coarse sand; trace silt; occasional cobbles to 5" size; stage I caliche (1.0'-1.5').						
	4										
	6		GP-GM								
	8			dense							
	10										
	12										
	14				TOTAL DEPTH 13.5' (4.1m)						
	16										
	18										
	20										

TRENCH DETAILS

SURFACE ELEVATION : 5475' (1669m)
 DATE EXCAVATED : 4 NOVEMBER 1978
 SURFICIAL GEOLOGIC UNIT : A5i
 TRENCH LENGTH : 14.3' (4.4m)
 TRENCH ORIENTATION : NE - SW

LOG OF TRENCH SE-T-4
 VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
 7-4

USRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0		SM	loose	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some silt; little fine to coarse gravel.	vertical walls sloughing	16	56	28		
	2										
	1										
	4										
	6										
	2										
	8		SP-SM	medium dense to dense	GRAVELLY SAND, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some fine to coarse gravel; trace silt; occasional cobbles to 4" size (2.0'-5.0'); stage I caliche (1.5'-2.5').	vertical walls stable					
	3										
	10										
	12										
	4										
	14				TOTAL DEPTH 14.0' (4.3m)						
	5										
	16										
	6										
	18										
	20										

TRENCH DETAILS

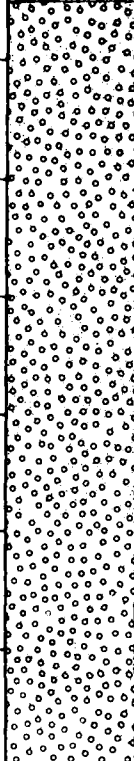
SURFACE ELEVATION : 5200' (1585m)
 DATE EXCAVATED : 5 NOVEMBER 1978
 SURFICIAL GEOLOGIC UNIT: A5i
 TRENCH LENGTH : 14.7' (4.5m)
 TRENCH ORIENTATION : W-E

LOG OF TRENCH SE-T-5
 VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
 7-5

FURRO NATIONAL INC.

BULK SAMPLE	DEPTH		LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
	METERS	FEET						GR	SA	FI	LL	PI
	0	0		SM	loose	SILTY SAND, brown, fine to coarse, poorly graded, slightly moist, subangular, calcareous; some silt.	vertical walls stable					
	2			GM	medium dense to dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, angular to subrounded, calcareous; some fine to coarse sand; little silt; occasional cobbles to 6" size (6.0'-8.0'); stage I caliche (1.5'-2.5').						
	4											
	6											
	8											
	10											
	12											
	14											
						TOTAL DEPTH 14.0' (4.3m)						
	16											
	18											
	20											

TRENCH DETAILS

SURFACE ELEVATION : 5375' (1638m)
 DATE EXCAVATED : 5 NOVEMBER 1978
 SURFICIAL GEOLOGIC UNIT: A5y
 TRENCH LENGTH : 14.3' (4.4m)
 TRENCH ORIENTATION : N-S

LOG OF TRENCH SE-T-6
 VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE SAMS

FIGURE
 7-6

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0			loose	SILTY SAND, brown, fine to coarse, poorly graded, slightly moist, sub-angular to subrounded, calcareous; some silt; trace fine gravel, layer of sandy gravel (8.0'-8.2'); occasional cobbles to 6" size.	vertical walls stable	4	72	24		
	2										
	4										
	6										
	8										
	10										
	12										
	14										
	16										
	18										
	20										
					TOTAL DEPTH 14.0' (4.3m)						

TRENCH DETAILS

SURFACE ELEVATION : 5070' (1545m)
 DATE EXCAVATED : 6 NOVEMBER 1978
 SURFICIAL GEOLOGIC UNIT : A4c
 TRENCH LENGTH : 18.0' (4.9m)
 TRENCH ORIENTATION : NE-SW

LOG OF TRENCH SE-T-7
 VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
 7-7

FUERO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0		SM	medium dense	GRAVELLY SAND, brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some fine to coarse gravel; little silt.		18	69	13		
	1		GP	dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some sand; trace silt; stage I caliche.						
	2										
	3		SM	dense	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some silt; trace fine gravel; layer of sandy gravel (4.0"-4.5").		12	50	38		
	4		GP	dense							
	5		SM	dense							
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5088' (1553m)
SURFICIAL GEOLOGIC UNIT: A5y/A4o

LOG OF TEST PIT SE-P-1

0	0										
1											
2											
3											
4											
5											

SURFACE ELEVATION:
SURFICIAL GEOLOGIC UNIT:


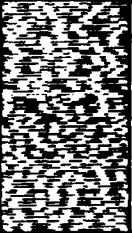
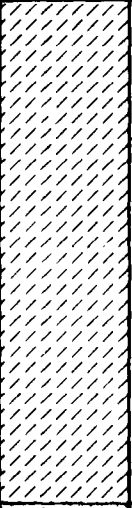

LOG OF TEST PIT

LOG OF TEST PIT SE-P-1
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
7-8

FURRO NATIONAL INC.

BULK SAMPLE	DEPTH		LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
	METERS	FEET						GR	SA	FI	LL	PI
	0	0		CL	firm	SILTY CLAY, brown, slightly moist, medium plastic, calcareous; little fine sand; stage I caliche						
	1											
	2											
				CH	very stiff	CLAY, light brown, slightly moist, medium to highly plastic, calcareous.						
	3											
	4											
				CL	firm	SANDY CLAY, light brown, slightly moist, slightly plastic, calcareous; little gravel (0.6"-8.0"); stage I caliche.						
	5											
	6											
	7											
	8			SM	dense	GRAVELLY SAND, light brown, medium to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; little fine gravel; trace silt; stage II caliche.						
	9											
	10											
						TOTAL DEPTH 10.0' (3.0m)						

SURFACE ELEVATION: 5010' (1527m)
SURFICIAL GEOLOGIC UNIT: A4a

LOG OF TEST PIT SE-P-2

LOG OF TEST PIT SE-P-2
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
7-9

WORD NATIONAL INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0		SM	loose	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; some silt; trace fine gravel.		8	64	28		
	1										
	2		GM	dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; some sand; occasional cobbles to 5" size; little silt; stage I caliche.						
	3										
	4										
	5				TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5055' (1547m)
SURFICIAL GEOLOGIC UNIT: A5y/A4o

LOG OF TEST PIT SE-P-3

	0		SM	loose	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, subrounded, calcareous; some silt; trace fine gravel.		9	61	30		
	1			medium dense	GRAVELLY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; some fine to coarse gravel; little silt; stage I caliche.						
	2			dense							
	3			very dense							
	4										
	5				TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5010' (1527m)
SURFICIAL GEOLOGIC UNIT: A5y, A4o

LOG OF TEST PIT SE-P-4

LOGS OF TEST PITS SE-P-3 AND SE-P-4
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
7-10

FURRO NATIONAL INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0		SM	loose	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, subrounded, calcareous; little silt; trace fine gravel; stage I caliche.						
	1										
	2		GP	dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some fine to coarse sand; occasional cobbles to 5" size (2.0'-5.0'); stage I caliche.						
	3										
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5198' (1584m)
SURFICIAL GEOLOGIC UNIT: A5i (S2)

LOG OF TEST PIT SE-P-5

	0		SM	loose	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; little silt; little fine to coarse gravel; stage I caliche.						
	1										
	2		GP-GM	medium dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; some fine to coarse sand; trace silt; stage I caliche.						
	3										
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5025' (1532m)
SURFICIAL GEOLOGIC UNIT: A5y/A4o

LOG OF TEST PIT SE-P-6

LOGS OF TEST PITS SE-P-5 AND SE-P-6
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SANSO

FIGURE
7-11

USO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS					
							GR	SA	FI	LL	PI	
	0		SM	loose	GRAVELLY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; and fine to coarse gravel; some silt; stage I caliche.		36	38	26			
	1											
	2		GP	medium dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, angular to subrounded, calcareous; some medium to coarse sand; stage I caliche.							
	3											
	4											
	5											
					TOTAL DEPTH 5.0' (1.5m)							

SURFACE ELEVATION: 5034' (1534m)
SURFICIAL GEOLOGIC UNIT: A5y/A4o

LOG OF TEST PIT SE-P-7

	0		SM	medium dense	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; some silt; some fine gravel; stage I caliche (1.0'-1.5').		22	46	32			
	1											
	2		GP-GM	medium dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some fine to coarse sand; trace silt; stage I caliche.							
	3											
	4											
	5											
					TOTAL DEPTH 5.0' (1.5m)							

SURFACE ELEVATION: 5301' (1616m)
SURFICIAL GEOLOGIC UNIT: A51

LOG OF TEST PIT SE-P-8

LOGS OF TEST PITS SE-P-7 AND SE-P-8
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMS

FIGURE
7-12

FURRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0		SM	loose	GRAVELLY SAND, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; little fine to coarse gravel; little silt.						
	1										
	2		GP-GM	medium dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some fine to coarse sand; trace silt; occasional cobbles to 8" size; stage I caliche.						
	3										
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5485' (1688m)
SURFICIAL GEOLOGIC UNIT: A51

LOG OF TEST PIT SE-P-9

	0		SM	loose	SILTY SAND, brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; little silt.						
	1										
	2		SC	dense	GRAVELLY SAND, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some fine to coarse gravel; little clay; stage I caliche.						
	3		CL	very stiff	SANDY CLAY, brown, slightly moist, medium plastic, calcareous; some fine to coarse sand.						
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5024' (1531m)
SURFICIAL GEOLOGIC UNIT: A5y A4o


LOG OF TEST PIT SE-P-10

LOGS OF TEST PITS SE-P-9 AND SE-P-10
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
7-13

FUSCO NATIONAL INC.

BULK SAMPLE	DEPTH		LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
	METERS	FEET						GR	SA	FI	LL	PI
	0	0				SANDY CLAY, green, slightly moist, medium plastic, calcareous; some fine sand.						
		1			stiff					64	38	17
		2										
		3										
	1	4										
		5		CL	very stiff							
		6										
	2	7										
		8										
		9										
	3	10										
						TOTAL DEPTH 10.0' (3.0m)						

SURFACE ELEVATION: 5053' (1540m)
SURFICIAL GEOLOGIC UNIT: A5y/A4o

LOG OF TEST PIT SE-P-11

LOG OF TEST PIT SE-P-11
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
7-14

VERO NATIONAL INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0										
	1		SM	dense	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; little silt; little fine gravel; occasional cobbles to 5" size (1.0'-5.0').						
	2										
	3		GM	very dense	SANDY GRAVEL, light brown, fine to coarse sand, poorly graded, slightly moist, subangular to subrounded, calcareous; some fine to coarse sand; some silt; stage I caliche.						
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5145' (1568m)
SURFICIAL GEOLOGIC UNIT: A5i

LOG OF TEST PIT SE-P-12

	0		SM	loose	SILTY SAND, dark brown, fine to coarse, poorly graded, moist, angular to subangular, calcareous.						
	1										
	2		GP-GM	dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; little fine to coarse sand, trace silt; occasional cobbles to 5" size; stage II caliche (2.0'-5.0').						
	3										
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5410' (1649m)
SURFICIAL GEOLOGIC UNIT: A5i

LOG OF TEST PIT SE-P-13

LOGS OF TEST PITS SE-P-12 AND SE-P-13
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
7-15

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0										
	1		SM	loose	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular, calcareous; some silt; some fine gravel.		21	54	25		NP
	2										
	3		GP-GM	dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; some sand; trace silt; occasional cobbles to 4" size; stage I caliche.						
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5069' (1545m)
SURFICIAL GEOLOGIC UNIT: A5y A4o

LOG OF TEST PIT SE-P-14

	0										
	1		SM	loose	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; little silt; trace fine gravel.						
	2										
	3		GP-GM	dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; little fine to coarse sand; trace silt; occasional cobbles to 5" size; stage I caliche (1.5'-4.0').						
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5160' (1573m)
SURFICIAL GEOLOGIC UNIT: A5I

LOG OF TEST PIT SE-P-15

LOGS OF TEST PITS SE-P-14 AND SE-P-15
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMS0

FIGURE
7-16

FUSRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS					
							GR	SA	FI	LL	PI	
	0											
	1		SM	loose	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some silt; little fine gravel; occasional cobbles and boulders to 1P" size (0.5"-5.0").		18	55	28			
	2											
	3		GP-GM	medium dense	SANDY GRAVEL, brown, fine to coarse, poorly graded, slightly moist, angular to subrounded, calcareous; little fine to coarse sand; trace silt; stage I caliche (1.0"-3.0").							
	4											
	5											
					TOTAL DEPTH 5.0' (1.5m)							

SURFACE ELEVATION: 5800' (1707m)
SURFICIAL GEOLOGIC UNIT: A51

LOG OF TEST PIT SE-P-16

	0											
	1											
	2											
	3											
	4											
	5											

SURFACE ELEVATION:
SURFICIAL GEOLOGIC UNIT:

LOG OF TEST PIT

LOG OF TEST PIT SE-P-16
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
7-17

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0				SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some silt; trace fine to coarse gravel.						
	1										
	2										
	3		SM	loose		vertical walls caving	11	88	23		
	4										
	5										
	6										
	7		GP-GM	medium dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist subangular to subrounded, calcareous; little fine to coarse sand; trace silt; stage I caliche (8.0"-8.0").	vertical walls stable					
	8										
	9										
	10				TOTAL DEPTH 8.0' (2.4m)						

SURFACE ELEVATION: 5114' (1558m)
SURFICIAL GEOLOGIC UNIT: A51

LOG OF TEST PIT SE-P-17

LOG OF TEST PIT SE-P-17
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
7-18

FURRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0										
	0										
	1		SP-SM	medium dense	GRAVELLY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; some fine to coarse gravel; trace silt; occasional cobbles to 10" size.						
	2										
	3		SM	medium dense	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; little silt; little fine to coarse gravel; stage I caliche; layer of sandy gravel (4.5'-5.0').						
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5248' (1600m)
SURFICIAL GEOLOGIC UNIT: A51

LOG OF TEST PIT SE-P-18

	0										
	0										
	1		SM	loose	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, angular to subrounded, calcareous; some silt; trace fine gravel; occasional cobbles to 4" size.						
	2										
	3		SM	medium dense	GRAVELLY SAND, light brown, fine to coarse, poorly graded, slightly moist, angular to subrounded calcareous; some fine to coarse gravel; little silt; occasional cobbles to 4" size; stage I caliche.						
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5220' (1591m)
SURFICIAL GEOLOGIC UNIT: A51

LOG OF TEST PIT SE-P-19

LOGS OF TEST PITS SE-P-18 AND SE-P-19
VERIFICATION SITE, SNAKE EAST COP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMS0

FIGURE
7-19

FURRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0				SILTY SAND, brown, fine to medium, poorly graded, slightly moist, calcareous; little silt; trace fine gravel.	vertical walls caving					
	1										
	2		SM	loose							
	3					vertical walls stable					
	4		GP	dense	SANDY GRAVEL, brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; little medium to coarse sand; occasional cobbles to 10" size; stage I caliche.						
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5355' (1632m)
SURFICIAL GEOLOGIC UNIT: A1

LOG OF TEST PIT SE-P-20

	0				SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; little silt; little fine gravel.						
	1		SM	loose							
	2										
	3		GM	medium dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, subangular, calcareous; some fine to coarse sand; little silt; occasional cobbles to 6" size; stage I caliche.						
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5485' (1672m)
SURFICIAL GEOLOGIC UNIT: A51

LOG OF TEST PIT SE-P-21

LOGS OF TEST PITS SE-P-20 AND SE-P-21
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SANSO

FIGURE
7-20

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH		LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
	METERS	FEET						GR	SA	FI	LL	PI
	0	0				GRAVELLY SAND, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some fine gravel; little silt.						
		1		SM	loose							
		2				SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; little fine to coarse sand; little silt; stage I caliche.						
		3		GM	medium dense							
		4										
		5				TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5425' (1654m)
SURFICIAL GEOLOGIC UNIT: A5i

LOG OF TEST PIT SE-P-22

	0	0				SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular, calcareous; some silt; little fine gravel.		18	52	30		
		1		SM	loose							
		2				SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, subangular, calcareous; some fine to coarse sand; little silt; occasional cobbles to 9" size; stage I caliche (1.0'-2.0').						
		3		GM	medium dense							
		4										
		5				TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5800' (1768m)
SURFICIAL GEOLOGIC UNIT: A5i

LOG OF TEST PIT SE-P-23

LOGS OF TEST PITS SE-P-22 AND SE-P-23
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
7-21

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS					
							GR	SA	FI	LL	PI	
	0											
	1		SM	loose	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, sub-angular, calcareous; some silt; trace fine gravel.							
	2											
	3		SP-SM	medium dense	GRAVELLY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular, calcareous; some fine to coarse gravel; trace silt; stage I caliche (2.0'-3.0').							
	4											
	5											
					TOTAL DEPTH 5.0' (1.5m)							

SURFACE ELEVATION: 5154' (1571m)
SURFICIAL GEOLOGIC UNIT: A5i

LOG OF TEST PIT SE-P-24

	0											
	1		ML	stiff	SANDY SILT, light brown, slightly moist, slightly plastic, calcareous; some fine sand.		0	47	53		NP	
	2											
	3		CL	very stiff	SILTY CLAY, light brown, slightly moist, medium plastic, calcareous.							
	4											
	5											
					TOTAL DEPTH 5.0' (1.5m)							

SURFACE ELEVATION: 5071' (1548m)
SURFICIAL GEOLOGIC UNIT: A4o

LOG OF TEST PIT SE-P-25

LOGS OF TEST PITS SE-P-24 AND SE-P-25
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
7-22

FUGRO NATIONAL INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0										
	1		SM	loose	SILTY SAND, brown, fine to coarse, poorly graded, slightly moist, sub-angular, calcareous; some silt; trace fine gravel.		6	58	36		
	2										
	3										
	4		SP-SM	medium dense	GRAVELLY SAND, brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some fine to coarse gravel; trace silt; occasional cobbles to 5" size; stage I caliche.						
	5										
	6										
	7		GP-GM	dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some fine to coarse sand; trace silt; occasional cobbles to 5" size.						
	8										
	9										
	10										
					TOTAL DEPTH 10.0' (3.0m)						

SURFACE ELEVATION: 5202' (1586m)
SURFICIAL GEOLOGIC UNIT: A5y

LOG OF TEST PIT SE-P-26

LOG OF TEST PIT SE-P-26
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
7-23

USRD NATIONAL INC.

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BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0										
	1		SM	loose	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some silt; trace fine gravel.		10	58	32		
	2										
	3		GP-GM	medium dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some fine to coarse sand; trace silt.						
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5280' (1609m)
SURFICIAL GEOLOGIC UNIT: A5y

LOG OF TEST PIT SE-P-27

	0										
	1		SM	loose	GRAVELLY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular, calcareous; little fine gravel; little silt; stage I caliche (2.0"-3.0").						
	2										
	3										
	4		GM	medium dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, subangular, calcareous; some fine to coarse sand; little silt.						
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5580' (1701m)
SURFICIAL GEOLOGIC UNIT: A5i

LOG OF TEST PIT SE-P-28

LOGS OF TEST PITS SE-P-27 AND SE-P-28
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
7-24

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0		SM	loose	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular, calcareous; some silt; trace fine gravel.						
	1										
	2		SP-SM	medium dense	GRAVELLY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular, calcareous; some fine to coarse gravel; trace silt; stage I caliche (1.0'-1.5').						
	3										
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5572' (1898m)
SURFICIAL GEOLOGIC UNIT: A51

LOG OF TEST PIT SE-P-29

	0		SM	loose	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some silt; trace fine gravel.		6	59	35		
	1										
	2		GP-GM	dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some fine to coarse sand; trace silt; stage I caliche (1.0'-2.0').						
	3										
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5870' (1728m)
SURFICIAL GEOLOGIC UNIT: A51

LOG OF TEST PIT SE-P-30

LOGS OF TEST PITS SE-P-29 AND SE-P-30
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SANSO

FIGURE
7-25

FUGRO NATIONAL, INC.

SECTION 8.0
SURFICIAL SAMPLE LOGS

EXPLANATIONS OF SURFICIAL SAMPLE LOGS

Finalized logs of the surficial samples are presented in this section. The explanations provided here are to serve as general guidelines to reading the logs.

A. Designations - Surficial samples are identified as follows:

SE-CS-1

SE - abbreviation for the site (e.g., SE - Snake East)

CS - abbreviation for surficial sample

1 - number of activity

B. Ground Surface Elevation - Indicated elevations on the logs are estimated from topographic maps of the study area within an accuracy of half the contour interval.

C. Surficial Geologic Unit - Indicates the surficial geologic unit in which the activity is located.

D. Depth - Indicates depth interval for which soil description is given.

E. USCS - Unified Soil Classification Symbol; see Table 6-1 of Section 6.0, "Boring Logs", for details of USCS.

F. Soil Description - Soil is described based on field visual descriptions and/or laboratory test results. See Section 6.0, "Boring Logs", for procedures of soil description.

G. Sieve Analysis, LL and PI - These are from results of laboratory tests. See Section 6.0, "Boring Logs", for explanation.

ACTIVITY NUMBER	GROUND SURFACE ELEVATION, FEET (METERS)	SURFICIAL GEOLOGIC UNIT	DEPTH, FEET (METERS)	USCS	SOIL DESCRIPTION	SIEVE ANALYSIS				
						GR	SA	FI	LL	PI
SE-CS-3	5080 (1548)	A5y A4o	0.0-2.0 (0.0-0.6)	GM	SANDY GRAVEL, light brown, fine to coarse, poorly graded, angular to subangular, calcareous; some fine to coarse sand; little silt.	43	37	20		
SE-CS-5	5024 (1531)	A5y A4o	0.0-1.0 (0.0-0.3)	SM	SILTY SAND, light brown, fine to coarse, poorly graded, subangular to subrounded, calcareous; little silt; trace fine gravel.					
			1.0-2.0 (0.3-0.6)	GM	SANDY GRAVEL, light brown, fine to coarse, poorly graded, subangular to subrounded; calcareous; little silt; occasional cobbles					
SE-CS-6	5016 (1529)	A5y A4o	0.0-2.0 (0.0-0.6)	SM	GRAVELLY SAND, light brown, fine to coarse, poorly graded, calcareous; trace silt; some fine gravel.					
SE-CS-8	5400 (1646)	A5i(S2)	0.0-0.75 (0.0-0.2)	SM	GRAVELLY SAND, light brown, fine to coarse, poorly graded; some fine gravel; some silt					
			0.75-2.0 (0.2-0.6)	GP	SANDY GRAVEL, light brown, fine to coarse, poorly graded, subangular to angular, calcareous; some fine to coarse sand; occasional cobbles.					
SE-CS-11	5130 (1564)	A4(S2)	0.0-2.0 (0.0-0.6)	SM	SILTY SAND, light brown, fine to coarse, poorly graded, calcareous; some nonplastic silt; trace fine gravel.	7	57	36		NP
SE-CS-14	5085 (1544)	A5y A4o	0.0-2.0 (0.0-0.6)	SM	SILTY SAND, light brown, fine to coarse, poorly graded, subrounded to subangular, calcareous; little silt; trace to some fine gravel; occasional cobbles.					
SE-CS-15	5185 (1574)	A5i	0.0-0.75 (0.0-0.2)	CL	SILTY CLAY, light brown, slightly plastic, calcareous; trace fine to coarse sand; trace fine gravel.					
			0.75-2.0 (0.2-0.6)	GP	SANDY GRAVEL, light brown, fine, poorly graded, subangular to subrounded, calcareous; some fine to coarse sand; trace silt; occasional cobbles.					
SE-CS-16	5240 (1597)	A5i	0.0-1.5 (0.0-0.5)	CL	SILTY CLAY, light brown, slightly plastic, calcareous; little fine sand; trace fine gravel.					
			1.5-2.0 (0.5-0.6)	GP	GRAVEL, brown, fine to coarse, poorly graded, angular to subangular, calcareous; some fine sand; occasional cobbles.					

LOGS OF SURFICIAL SOIL SAMPLES
VERIFICATION SITE,
SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSCO

FIGURE
8-1
1 OF 5

FUGRO NATIONAL INC.

ACTIVITY NUMBER	GROUND SURFACE ELEVATION, FEET (METERS)	SURFICIAL GEOLOGIC UNIT	DEPTH, FEET (METERS)	USCS	SOIL DESCRIPTION	SIEVE ANALYSIS				
						GR	SA	FI	LL	PI
SE-CS-18	5007 (1528)	A5y A4o	0.0-1.0 (0.0-0.3)	CL	SANDY CLAY, brown, slightly plastic, calcareous; some fine to medium sand, trace fine gravel.					
			1.0-2.5 (0.3-0.8)	GC	CLAYEY GRAVEL, brown, fine, poorly graded, subrounded, calcareous; some fine to medium sand; some slightly plastic clay.					
SE-CS-20	5335 (1626)	A5i	0.0-2.0 (0.0-0.6)	GM	SANDY GRAVEL, light brown, fine to coarse, poorly graded, subangular to angular, calcareous; some fine to coarse sand; little silt; occasional cobbles.					
SE-CS-23	5025 (1532)	A4o	0.0-0.75 (0.0-0.2)	SM	SILTY SAND, light brown, fine to medium, poorly graded, calcareous; some silt.					
			0.75-2.0 (0.2-0.6)	CL	SANDY CLAY, brown, slightly plastic, calcareous; some fine to medium sand.					
SE-CS-24	5028 (1533)	A4o	0.0-2.0 (0.0-0.6)	CL	SANDY CLAY, light brown, slightly to medium plastic, calcareous; trace to some fine to coarse sand.					
SE-CS-28	5125 (1562)	A5i	0.0-2.0 (0.0-0.6)	GM	SILTY GRAVEL, light brown, fine to coarse, poorly graded, subangular to angular, calcareous; some highly plastic silt; some fine to coarse sand.	34	26	40	52	18
SE-CS-32	5110 (1558)	A5y/A4o	0.0-2.0 (0.0-0.6)	SM	SILTY SAND, brown, fine to coarse, poorly graded, calcareous; trace to some silt; trace to some fine gravel.					
SE-CS-38	5170 (1578)	A5i	0.0-2.0 (0.0-0.6)	GP-GM	SANDY GRAVEL, brown, fine to coarse, poorly graded, subangular to subrounded, calcareous; little fine to coarse sand; trace silt; occasional cobbles.					
SE-CS-40	5340 (1628)	A5i	0.0-1.5 (0.0-0.5)	SM	SILTY SAND, light brown, fine to coarse, poorly graded, calcareous; some silt; some fine gravel.					
			1.5-2.5 (0.5-0.8)	GM	SANDY GRAVEL, light brown, fine to coarse, poorly graded, subangular to subrounded, calcareous; some fine to coarse sand; trace silt; occasional cobbles.					

LOGS OF SURFICIAL SOIL SAMPLES
VERIFICATION SITE,
SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
8-1
2 OF 5

FUGRO NATIONAL, INC.

ACTIVITY NUMBER	GROUND SURFACE ELEVATION, FEET (METERS)	SURFICIAL GEOLOGIC UNIT	DEPTH, FEET (METERS)	USCS	SOIL DESCRIPTION	SIEVE ANALYSIS				
						GR	SA	FI	LL	PI
SE-CS-43	5754 (1754)	S5t	0.0-0.75 (0.0-0.2)	SM	SILTY SAND, brown, fine to coarse, poorly graded, calcareous; some silt; some fine to coarse gravel.	18	47	35		
			0.75-2.0 (0.2-0.6)	GM	SANDY GRAVEL, light brown, fine, poorly graded, subrounded to subangular, calcareous; some fine to coarse sand; trace silt.					
SE-CS-45	5175 (1577)	A5i	0.0-1.5 (0.0-0.5)	SM	SILTY SAND, brown, fine to coarse, poorly graded, calcareous; some silt; some fine gravel.					
			1.5-2.5 (0.5-0.8)	GP-GM	SANDY GRAVEL, light brown, fine to coarse, poorly graded, subangular, calcareous; some fine sand; trace silt; occasional cobbles.					
SE-CS-46	5240 (1597)	A5i	0.0-0.75 (0.0-0.2)	SM	SILTY SAND, light brown, fine to coarse, poorly graded, calcareous; some silt; trace fine gravel.					
			0.75-2.0 (0.2-0.6)	GP	SANDY GRAVEL, light brown, fine to coarse, poorly graded, angular to subangular, calcareous; some fine to coarse sand; trace silt.					
SE-CS-47	5295 (1614)	A5i	0.0-1.5 (0.0-0.5)	SM	SILTY SAND, brown, fine to coarse, poorly graded, calcareous; some slightly plastic silt; little fine gravel.	13	52	35		
			1.5-4.0 (0.5-1.2)	SP	GRAVELLY SAND, brown, fine to coarse, poorly graded, calcareous; some fine to coarse gravel; trace silt.					
SE-CS-48	5535 (1687)	A5i	0.0-1.0 (0.0-0.3)	SM	SILTY SAND, light brown, fine to coarse, poorly graded, calcareous; some silt; trace fine gravel.					
			1.0-2.0 (0.3-0.6)	GP	SANDY GRAVEL, light brown, fine to coarse, poorly graded, subangular to subrounded, calcareous; little fine to coarse sand; trace silt; occasion- al cobbles.					
SE-CS-51	5380 (1640)	A5i	0.0-2.5 (0.0-0.8)	SM	GRAVELLY SAND, brown, fine to coarse, poorly graded, calcareous; some fine gravel; little silt.					
SE-CS-53	5330 (1625)	A5i	0.0-1.0 (0.0-0.3)	SM	SILTY SAND, light brown, fine to coarse, poorly graded, calcareous; little silt; trace fine gravel.					
			1.0-2.0 (0.3-0.6)	SP	GRAVELLY SAND, light brown, fine to coarse, poorly graded, calcareous; little fine to coarse gravel; trace silt.					

LOGS OF SURFICIAL SOIL SAMPLES
VERIFICATION SITE,
SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
8-1
3 OF 5

FUGRO NATIONAL INC.

ACTIVITY NUMBER	GROUND SURFACE ELEVATION, FEET (METERS)	SURFICIAL GEOLOGIC UNIT	DEPTH, FEET (METERS)	USCS	SOIL DESCRIPTION	SIEVE ANALYSIS				
						GR	SA	FI	LL	PI
SE-CS-58	5400 (1646)	A5i	0.0-1.5 (0.0-0.5)	SM	SILTY SAND, brown, fine to coarse, poorly graded, calcareous; some silt; trace fine gravel.	7	63	30		
			1.5-2.5 (0.5-0.8)	GP	SANDY GRAVEL, light brown, fine to coarse, poorly graded, subangular to angular, calcareous; little fine to coarse sand; trace silt.					
SE-CS-60	5566 (1697)	A5i	0.0-0.75 (0.0-0.2)	SM	SILTY SAND, light brown, fine to coarse, poorly graded, calcareous; some silt; trace fine gravel.	11	65	24		
			0.75-2.0 (0.2-0.8)	GP	SANDY GRAVEL, light brown, fine to coarse, poorly graded, subangular to subrounded, calcareous; some fine to coarse sand; trace silt; occasional cobbles.					
SE-CS-63	5085 (1550)	A5y, A4o	0.0-1.0 (0.0-0.3)	SM	SILTY SAND, light brown, fine to coarse, poorly graded, calcareous; some silt; trace fine gravel.					
			1.0-2.0 (0.3-0.6)	GP	SANDY GRAVEL, light brown, fine, poorly graded, subangular to subrounded, calcareous; some fine to coarse sand; trace silt.					
SE-CS-65	5218 (1590)	A5i	0.0-1.0 (0.0-0.3)	SM	SILTY SAND, light brown, fine to coarse, poorly graded, calcareous; some silt; some fine gravel.	24	50	28		
			1.0-2.0 (0.3-0.6)	SP	GRAVELLY SAND, light brown, fine to coarse, poorly graded, calcareous; some fine gravel; occasional cobbles.					
SE-CS-66	5129 (1572)	A5y	0.0-1.0 (0.0-0.3)	CL	SANDY CLAY, brown, slightly plastic, calcareous; some fine sand.			53	27	10
			1.0-2.0 (0.3-0.6)	SP-SM	GRAVELLY SAND, light brown, fine to coarse, poorly graded, calcareous; little fine gravel; trace silt.					
SE-CS-69	5366 (1636)	A5y	0.0-1.5 (0.0-0.5)	SM	SILTY SAND, light brown, fine to coarse, poorly graded, subangular, calcareous; some silt; trace fine gravel.					
			1.5-2.0 (0.5-0.6)	SP	SAND, light brown, fine to coarse, poorly graded, subangular, calcareous; little fine gravel.					
SE-CS-70	5480 (1670)	A5i	0.0-1.5 (0.0-0.5)	SC	CLAYEY SAND, brown, fine to coarse, poorly graded, calcareous; some slightly plastic clay; trace fine gravel.	9	48	43		
			1.5-2.0 (0.5-0.6)	GP-GM	SANDY GRAVEL, light brown, fine to coarse, poorly graded, angular to subrounded, calcareous; some fine to coarse sand.					

LOGS OF SURFICIAL SOIL SAMPLES
VERIFICATION SITE,
SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
8-1
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FUORD NATIONAL, INC.

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APV-17

ACTIVITY NUMBER	GROUND SURFACE ELEVATION, FEET (METERS)	SURFICIAL GEOLOGIC UNIT	DEPTH, FEET (METERS)	USCS	SOIL DESCRIPTION	SIEVE ANALYSIS				
						GR	SA	FI	LL	PI
SE-CS-71	5480 (1870)	A5i	0.0-1.5 (0.0-0.5)	SC	CLAYEY SAND, brown, fine to coarse, poorly graded, calcareous; some slightly plastic clay; trace fine gravel.					
			1.5-2.0 (0.5-0.6)	GP	SANDY GRAVEL, light brown, fine to coarse, poorly graded, angular to subrounded, calcareous; some fine to coarse sand.					
SE-CS-74	5730 (1748)	A5i	0.0-2.0 (0.0-0.6)	SM	SILTY SAND, light brown, fine to coarse, poorly graded, subangular, calcareous; little silt; little fine gravel.	14	67	18		
SE-CS-76	5645 (1721)	A5i	0.0-2.0 (0.0-0.6)	GM	SANDY GRAVEL, light brown, fine to coarse, poorly graded, subangular to angular, calcareous; some fine to coarse sand; little silt; occasional cobbles.	59	26	15		

LOGS OF SURFICIAL SOIL SAMPLES
VERIFICATION SITE,
SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
8-1
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FUGRO NATIONAL, INC.

SECTION 9.0
LABORATORY TEST RESULTS

EXPLANATIONS OF LABORATORY TEST RESULTS

Laboratory test results are presented in this section. Table 9-1 contains a summary of laboratory test results. This table contains results of sieve analysis; plasticity data; in-situ dry unit weight, moisture content, degree of saturation, and void ratio for drive and Pitcher samples; results of compaction tests; and specific gravity of solids. Other tests such as triaxial compression, unconfined compression, direct shear, consolidation, chemical, and California Bearing Ratio (CBR) are indicated on the table. Tables 9-2 through 9-6 and Figures 9-1 through 9-3 present results of triaxial compression, unconfined compression, direct shear, consolidation, chemical, and CBR tests.

All tests were performed in general accordance with the American Society for Testing and Materials (ASTM) procedures. The following table presents the ASTM designations for the tests performed during the investigation.

<u>Type of Test</u>	<u>ASTM Designations</u>
Particle Size Analysis	D 422-63
Liquid Limit	D 423-66
Plastic Limit	D 424-59
Unit Weight	D 2937-71
Moisture Content	D 2216-71
Compaction	D 1557-70
Specific Gravity of Solids	D 854-58
Triaxial	D 2850-70
Unconfined Compression	D 2166-66
Direct Shear	D 3080-72
Consolidation	D 2435-70
Test for Alkalinity (pH)	D 1067-70
Water Soluble Sodium	D 1428-64
Water Soluble Chloride	D 512-67
Water Soluble Sulphate	D 516-68
Water Soluble Calcium	D 511-72
Calcium Carbonate	D 1126-67
California Bearing Ratio (CBR)	D 1883-73

Explanation for the tables and figures presented in this section are as follows.

- A. Activity Number - Boring, trench, test pit, or surficial sample designation.
- B. Sample Number - Prefix indicates the type of sample; explanation is at the bottom of the table.
- C. Sample Interval - This is the depth range measured from ground surface over which the sample was obtained.
- D. Percent Finer by Weight - Presents the results of laboratory particle size analysis (ASTM D 422-63) performed on representative soil samples at the depth indicated. The numbers represent the percent (by dry weight) of the total sample weight passing through each sieve size indicated.
- E. Atterberg Limits (ASTM D 423-66 and D 424-59)
 - LL - Liquid Limit, the water content (as percent of soil dry weight) corresponding to the arbitrary limit between the liquid and plastic states of consistency of a soil (ASTM D 423-66).
 - PL - Plastic Limit, the water content corresponding to an arbitrary limit between the plastic and the semisolid state of consistency of a soil (ASTM D 424-59).
 - PI - Plasticity Index, numerical difference between the liquid limit (LL) and the plastic limit (PL) indicating the range of moisture content within which a soil-water mixture is plastic.
 - NP - Nonplastic.
- F. USCS - Unified Soil Classification Symbols are given here; see Table 6.1 in Section 6.0, "Boring Logs", for complete details of USCS system.

G. In Situ - Presents results of tests on drive and Pitcher samples.

Dry Unit Weight - indicates dry unit weight of soil determined as per ASTM D 2937-71

Moisture Content - weight of water reported in percent of dry weight of soil sample (ASTM D 2216-71)

Saturation - the degree of saturation in a soil sample is defined as the ratio (in percent) of the volume of water to the volume of all voids in the soil

Void Ratio - the numerical ratio of the volume of voids to the volume of solids in a soil specimen

H. Compacted - Indicates results of laboratory maximum dry density and optimum moisture content test as per ASTM D 1557-70.

I. Specific Gravity of Solids (ASTM D 854-58) - Indicates the ratio of (1) the weight in air of a given volume of soil solids at a stated temperature, to (2) the weight in air of an equal volume of distilled water at a stated temperature.

J. Triaxial - The triaxial compression tests were performed in accordance with the procedures of ASTM D 2850-70. The following explanations and definitions apply.

Triaxial Compression Test - a cylindrical specimen of soil is surrounded by a fluid in a pressure chamber and subjected to an isotropic pressure. An additional compressive load is then applied, directed along the axis of the specimen called the axial load.

Consolidated-Drained (CD) Test - a triaxial compression test in which the soil was first consolidated under an all-around confining stress (test chamber pressure), and was then compressed (and hence sheared) by increasing the

vertical stress. Drained indicates that excess pore water pressure generated by strains are permitted to dissipate by the free movement of pore water during consolidation and compression.

Consolidated-Undrained (CU) Test - a triaxial compression test in which essentially complete consolidation under the confining (chamber) pressure is followed by a shear test at constant water content.

Confining Pressure (σ_3) - the isotropic chamber pressure applied to the soil specimen during consolidation and compression.

Maximum Deviator Stress ($\sigma_1 - \sigma_3$) - the difference between the major and minor principal stresses in the specimen at failure. The major principal stress on the specimen is equal to the unit axial load plus the chamber pressure and the minor principal stress on the specimen is equal to the chamber pressure.

Strain Rate - axial strain, ϵ , at a given stress level is defined as the ratio of the change in length (ΔL) of the specimen to the original length of the specimen (L_0). The rate of strain was controlled during the test so that this ratio increased at equal increments for each minute of testing.

Back Pressure - pressure in excess of atmospheric applied to the pore water of a soil sample. Back pressure is usually applied to (1) increase saturation of the sample, or (2) simulate the actual in-situ pressure regime.

- K. Unconfined Compression - Test procedures were as described in ASTM D 2166-66. Unconfined compressive strength is defined as the load per unit area at which an unconfined prismatic or cylindrical specimen of soil will fail in a simple compression test. In these methods, unconfined compressive strength is taken as the maximum load attained per unit area or the load per unit area at 20 percent axial strain, whichever occurred first during the performance of a test.

- L. Direct Shear - The procedures of ASTM D 3080-72 were followed for direct shear testing. In this test, soil under an applied normal load is stressed to failure by moving one section of the soil container (shear box) relative to the other section. Normal stress is the value of load per unit area acting perpendicular to the plane of shearing. Maximum shear strength is defined as the maximum resistance (ksf) of a soil to shearing (tangential) stresses.
- M. Consolidation (ASTM D 2435-70) - A consolidation test is a test in which a cylindrical soil specimen is laterally confined in a ring and compressed between porous plates. The term "consolidation", as used here, indicates the gradual reduction in volume of the soil mass resulting from an increase in compressive stress (axial load per unit area).
- N. Chemical - The chemical tests performed on soil samples included: pH; water soluble sodium, chloride, sulphate, calcium; and calcium carbonate content. pH is an index of the acidity or alkalinity of a soil in terms of the logarithm of the reciprocal of the hydrogen ion concentration. ASTM test procedure designations for these chemical tests are included in the table at the beginning of the "Explanation of Laboratory Test Results".
- O. CBR - California Bearing Ratio (CBR) is the ratio (in percent) of the resistance to penetration developed by a subgrade soil to that developed by a standard crushed-rock

base material. The procedures for conducting a CBR test were as outlined in ASTM D 1883-73. The materials tested for CBR were also analyzed for particle size distribution (ASTM D 422-63) and compaction characteristics (ASTM D 1557-70). The term "percentage of maximum density" indicates the ratio (as a percentage) of the compacted sample dry unit weight to maximum dry density obtained in the laboratory from ASTM D 1557-70, "Moisture-Density Relations of Soils Using 10-pound (4.5 kg) Hammer and 18-inch (457 mm) Drop".

ACTIVITY NUMBER	SAMPLE NUMBER (a)	SAMPLE INTERVAL		PERCENT FINER BY WEIGHT									
				STANDARD SIEVE OPENING							U S STANDARD		
				BLDRS	COBBLES		GRAVEL					SAND	
		FEET	METERS	24"	12"	6"	3"	1½"	¾"	3/8"	4	10	
SE-B-1	P-1	0.0-1.9	0.00-0.58							100	96	92	
	D-2	3.1-3.8	0.94-1.16					100	90	77	62	52	
	D-3	6.5-7.2	1.98-2.19					100	89	73	53	37	
	D-4	11.2-11.9	3.41-3.63										
	D-5	16.2-16.9	4.94-5.15										
	D-6	21.2-21.9	6.46-6.68					100	87	78	59	42	
	D-8	31.0-31.6	9.45-9.63										
	D-9	41.4-41.9	12.62-12.77										
	D-10	51.4-51.9	15.67-15.82					100	96	80	71	66	
	D-11	62.4-62.9	19.02-19.17										
	D-12	71.3-71.8	21.73-21.88										
	D-13	85.4-85.9	26.03-26.18						100	81	54	36	
	D-14	100.5-100.9	30.63-30.75										
	D-16	119.0-119.5	36.27-36.42										
	D-17	140.8-141.3	42.92-43.07						100	83	62	46	
	D-18	160.4-160.9	48.89-49.04										
SE-B-2	P-1	0.0-2.2	0.00-0.67					100	97	93	72	42	
	D-4	10.0-10.4	3.05-3.17										
	D-5	13.7-14.4	4.18-4.39										
	D-6	17.6-18.3	5.36-5.58						100	98	83	33	
	D-7	21.6-22.3	6.58-6.80										
	P-8	24.0-25.6	7.32-7.80										
	P-9	30.5-33.0	9.30-10.06					100	97	89	69	48	
	D-11	50.4-50.9	15.36-15.51					100	93	84	65	50	
SE-B-3	P-1	0.0-2.6	0.00-0.79								100	99	
	P-2	4.0-5.3	1.22-1.62										
	D-3	8.6-9.3	2.62-2.83										
	D-4	12.1-12.8	3.69-3.90										
	D-5	15.2-15.9	4.63-4.85						100	83	58	39	
	D-6	20.2-20.9	6.16-6.37										
	D-7	25.3-25.9	7.71-7.89										
	D-8	30.2-30.9	9.20-9.42										
	P-9	40.0-41.8	12.19-12.74						100	90	81	72	
	P-10	50.0-51.4	15.24-15.67										
	P-11	59.5-60.7	18.14-18.50										
	P-12	69.5-70.0	21.18-21.34									100	
	P-13	82.0-83.7	24.99-25.51										
	P-14	89.0-90.0	27.13-27.43										
	D-15	100.7-101.2	30.69-30.85										
	D-16	114.3-114.8	34.84-34.99										
	D-17	130.3-130.8	39.72-39.87					100	83	73	55	39	

NOTES:

(a) Sample types

SS - Standard split spoon

P - Pitcher

D - Fugro Drive

B, b - Bulk

(b) NP - Not Plastic

(c) USCS Unified Soil Classification System

(d) * Indicates that test has been performed
and results are included in this report

CHECKED BY _____ APPROVED BY _____

LIGHT						ATTERBERG LIMITS (b)			USCS (c)	IN-SITU					COMPACTED			SPECIFIC GRAVITY OF SOLIDS	TRIAxIAL (d)	UNCONFINED COMPRESSION	
STANDARD SIEVE NO				PARTICLE SIZE (mm)						DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)				
SAND		SILT OR CLAY		(pcf)	(kg/m ³)					(pcf)	(kg/m ³)				(pcf)	(kg/m ³)					
10	40	100	200	.005	.001	LL	PL	PI													
92	82	39	21						SC-SM	98.1	1571	4.1	15.4	0.72							
52	41	22	15			27	20	7	SC-SM	116.2	1861	2.7	16.4	0.45				2.67			
37	29	12	8						GP-GM	124.0	1986	2.0	15.4	0.36							
									GP-GM	122.6	1964	2.6	18.5	0.38							
									SP-SM	126.7	2030	8.3	68.2	0.33							
42	30	19	12						SP-SM	131.6	2108	5.8	56.2	0.28							
									SM	131.3	2103	9.5	91.1	0.28							
									SM	122.9	1969	7.0	50.8	0.37							
66	59	31	18						SM	113.7	1821	13.3	74.7	0.48							
									SM	112.7	1805	6.5	35.6	0.50							
									SM												
36	28	20	12						GW-GM	136.3	2183	6.0	68.9	0.24							
									GW-GM	120.1	1924	13.0	87.2	0.40							
									SM	135.1	2164	9.8	100.0	0.25							
46	34	29	22						SM	133.0	2130	10.5	100.0	0.27							
									GM	132.2	2118	9.7	95.8	0.27							
42	14	9	7						SW-SM	107.6	1724	2.6	12.4	0.57							
									SP	122.4	1961	2.1	15.2	0.38							
									SP	111.5	1786	10.4	55.0	0.51							
33	4	3	2						SP	110.5	1770	11.1	57.3	0.52							
						46	29	17	ML	89.6	1435	30.8	94.5	0.88				2.67			
						40	26	14	ML	83.4	1336	35.4	93.7	1.02							*
48	28	22	18						SM	118.5	1898	15.6	99.6	0.42							
50	26	18	14						SM	120.3	1927	8.5	57.2	0.40							
99	91	69	48						SM	94.2	1509	8.0	27.5	0.79							
	100	96	67						ML	90.9	1456	6.9	21.7	0.85							
									SM	105.7	1693	8.1	36.9	0.59							
									SM	116.7	1869	5.5	33.2	0.44							
39	22	12	8						SW-SM	122.8	1967	10.9	79.4	0.37							
									SW-SM	114.2	1829	8.3	47.4	0.48							
									GP-GM	126.8	2031	8.9	72.9	0.33							
									GP-GM	126.7	2030	9.7	79.1	0.33							
72	63	52	38						SM	108.4	1736	13.4	65.2	0.55							*
									SM	120.8	1935	9.6	65.6	0.40							
									SM	120.5	1930	8.6	58.3	0.40							
100	97	93	84	39	15	38	20	18	CL	122.2	1957	13.8	98.5	0.38							
									SM												
									SM												
									SM												
									SM												
									GM												
39	24	18	13						GM	130.0	2082	9.2	84.4	0.30							

SUMMARY
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MX SITE
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<p>SUMMARY OF LABORATORY TEST RESULTS VERIFICATION SITE, SNAKE EAST CDP, UTAH</p>	
<p>MX SITING INVESTIGATION DEPARTMENT OF THE AIR FORCE SAMS0</p>	<p>TABLE 9-1 1 OF 3</p>
<p>FUGRO NATIONAL, INC.</p>	

D-18	145.2-145.7	44.26-44.41										
P-1	1.0-2.5	0.30-0.76						100	81	75	70	
P-2	3.0-5.3	0.91-1.62						100	98	96	95	
D-3	8.3-9.0	2.53-2.74										
P-4	12.0-12.9	3.66-3.93										
P-4	12.9-14.0	3.93-4.27										
D-5	20.2-20.9	6.16-6.37										
P-6	24.0-26.5	7.32-8.08							100	94	86	
P-7	30.0-30.7	9.14-9.36										
P-7	30.7-31.4	9.36-9.57										
P-7	31.4-32.1	9.57-9.78										
P-8	40.5-42.6	12.34-12.98										100
P-9	50.0-50.8	15.24-15.47						100	99	95	81	
P-9	50.8-51.5	15.47-15.70							100	91	73	
P-9	51.5-52.2	15.70-15.91										
P-9	52.2-52.8	15.91-16.09						100	99	91	69	
P-10	60.0-61.2	18.29-18.65							100	95	85	
P-11	70.0-72.8	21.34-22.19										
P-12	79.0-79.8	24.08-24.32										
P-13	90.0-90.9	27.43-27.71										
P-14	105.0-106.9	32.00-32.58										
P-15	118.5-119.2	36.12-36.33										
P-16	140.5-142.2	42.82-43.34										
D-17	160.0-160.4	48.77-48.89										
D-1	0.8-1.5	0.24-0.46						100	90	54	36	29
D-2	2.8-3.5	0.85-1.07						100	68	51	39	27
D-3	6.2-6.9	1.89-2.10							100	64	47	33
D-4	10.2-10.9	3.11-3.32										
D-5	15.2-15.9	4.63-4.85							100	88	59	35
D-6	20.2-20.9	6.16-6.37										
D-7	25.2-25.9	7.68-7.89										
D-8	30.1-30.5	9.17-9.30							100	90	74	49
D-9	40.4-40.9	12.31-12.47										
D-10	50.4-50.9	15.36-15.51										
D-11	60.4-60.9	18.41-18.56										
D-12	70.8-71.3	21.58-21.73										
D-13	85.4-85.9	26.03-26.18							100	97	81	63

STANDARD SIEVE NO					PARTICLE SIZE (mm)	ATTERBERG LIMITS (b)			USCS (c)	IN-SITU					COMPACTED			SPECIFIC GRAVITY OF SOLIDS	TRIAxIAL (d)	UNCONFINED COMPRESSION	
SAND			SILT OR CLAY		LL	PL	PI	DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)						
	40	100	200	.005				.001					(pcf)	(kg/m³)		(pcf)	(kg/m³)				
									GM	133.4	2137	8.4	86.3	0.26							
	60	47	28	10	3				SM	99.6	1595	2.4	9.5	0.69							
	85	69	37						SM	87.3	1398	3.6	10.6	0.93							
									SM	109.1	1748	8.7	43.3	0.55							
									CL-ML	76.2	1221	26.6	50.3	1.21							*
						33	24	9	CL-ML	85.1	1363	16.8	46.3	0.98				2.66			
									SP-SM	112.8	1807	11.1	60.9	0.49							
	69	52	34						SM	96.3	1543	13.7	49.2	0.75							
	100	99	94			33	26	7	ML	79.0	1266	21.5	51.4	1.13						*	
			91						ML	78.7	1261	20.6	48.8	1.14						*	
						27	21	6	CL-ML	87.4	1400	13.6	49.2	0.75							
	93	76	59	24	4				ML	94.8	1519	19.5	67.8	0.78						*	
	61	48	37			21	20	1	SM	99.7	1597	17.1	66.9	0.69						*	
	48	31	19						SM	103.6	1660	12.2	52.3	0.63						*	
									SM	106.0	1698	11.7	53.6	0.59						*	
	40	23	14						SM												
	73	61	44	17	4				SM	109.8	1759	8.6	43.6	0.54							
									SM												
			37					NP	SM	106.8	1711	8.0	37.7	0.58							
									SM	107.6	1724	12.2	58.4	0.57							
									SM	104.5	1674	13.2	58.1	0.61							
						27	22	5	CL-ML	97.9	1568	16.1	60.3	0.72						*	
									SP-SM												
			12					NP	SP-SM	125.9	2017	9.1	72.4	0.34							
	22	17	13						GM	102.0	1634	4.1	16.8	0.65							
	13	7	5						GW-GM	124.8	1999	1.9	14.8	0.35							
	21	14	10						GP-GM	128.5	2058	2.0	17.2	0.31							
									SP-SM	118.1	1892	4.7	29.9	0.43							
	17	11	8						SP-SM	125.2	2006	7.2	56.3	0.35							
									SP-SM	124.0	1986	11.1	83.9	0.36							
									SP-SM	125.7	2014	5.6	44.2	0.34							
	21	13	10						SP-SM	124.7	1998	9.3	71.8	0.35							
									SP-SM	123.7	1981	9.5	71.1	0.36							
									SM	123.6	1980	11.6	86.3	0.36							
									SM	123.9	1985	9.5	71.6	0.36							
									SP-SM	123.4	1977	4.1	30.0	0.37							
	45	34	29						SM												
									SM	117.2	1877	10.3	63.6	0.44							
									SM	132.3	2119	8.3	81.9	0.27							
	35	24	19						SM	120.1	1924	12.2	81.4	0.40							
									SM	126.2	2022	7.5	60.7	0.34							

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D-10	50.4-50.9	15.36-15.51		
D-11	60.4-60.9	18.41-18.56		
D-12	70.4-70.9	21.46-21.61		
D-13	85.3-85.8	26.00-26.15		
D-14	100.4-100.9	30.60-30.75		
D-15	120.4-120.9	36.70-36.85		
D-16	140.4-140.9	42.79-42.95		
D-17	160.3-160.8	48.86-49.01		
D-1	1.2-1.9	0.37-0.58		
D-2	3.8-4.4	1.16-1.34		
D-3	6.1-6.8	1.86-2.07		
D-4	10.2-10.9	3.11-3.32		
D-5	15.2-15.9	4.63-4.85		
D-6	20.2-20.9	6.16-6.37		
D-7	25.2-25.9	7.68-7.89		
D-8	30.2-30.9	9.20-9.42		
D-9	40.2-40.9	12.25-12.47		
D-10	50.9-51.4	15.51-15.67		
D-11	60.4-60.9	18.41-18.56		
D-12	75.3-75.8	22.95-23.10		
D-13	90.0-90.4	27.43-27.55		
D-14	105.0-105.4	32.00-32.13		
D-16	141.0-141.4	42.98-43.10		
D-17	160.0-160.4	48.77-48.89		

					GM	105.9	1696	6.2
					SM	110.4	1768	4.7
					SM	118.1	1892	2.2
					SM	128.3	2055	2.4
					SM	124.9	2001	8.8
					SP	120.2	1925	12.6
					GM	118.5	1898	9.2
					GM	126.1	2020	9.3
					GM	125.8	2015	8.2
					SM	108.4	1736	10.6
					SM	129.3	2071	8.8
					SM	119.4	1913	10.2
					SM	123.2	1973	7.6
					SM	119.7	1917	9.1
					SM	127.3	2039	6.1
					SM	138.5	2219	4.5
					SM	136.6	2188	6.7
					SM	99.9	1600	4.0
					SM	128.9	2065	2.0
					SP-SM	122.7	1965	1.5
					SW-SM	126.8	2031	2.0
					SW-SM	131.1	2100	8.0
					SW-SM	126.6	2028	6.1
					SM	115.0	1842	9.9
					SP-SM	127.9	2049	8.9
					SP-SM	116.6	1868	13.0
					SP-SM	124.3	1991	10.8
					SP-SM	130.9	2097	10.1
					SP-SM	129.5	2074	7.6
					SP-SM	128.5	2058	7.8
					SP-SM	131.3	2103	8.3
					SP-SM	124.6	1996	12.3
					SP-SM	111.8	1791	12.7
					SM	87.3	1398	7.1
					GM	114.5	1834	1.8
					SP-SM	125.4	2009	8.9
					SP-SM	109.7	1757	6.1
					SP-SM	123.7	1981	10.8
					SP-SM	115.1	1844	9.6
					SP-SM	130.9	2097	5.7
					GP-GM	134.7	2158	10.4

<p>SUMMARY OF LABORATORY TEST RESULTS VERIFICATION SITE, SNAKE EAST CDP, UTAH</p>	
<p>MX SITING INVESTIGATION DEPARTMENT OF THE AIR FORCE SAMSO</p>	<p>TABLE 8-1 3 OF 3</p>

FURRO NATIONAL, INC.

AFV-01

ACTIVITY NUMBER	SAMPLE NUMBER (a)	SAMPLE INTERVAL		PERCENT FINER BY WEIGHT									
				STANDARD SIEVE OPENING								U S STA	
				BLDRS.	COBBLES		GRAVEL				SAND		
		FEET	METERS	24"	12"	6"	3"	1½"	3/4"	3/8"	4	10	
SE-B-8	D-9	60.0-60.5	18.29-18.44										
	D-10	80.0-80.1	24.38-24.41					100	90	76	56	40	
	D-11	101.0-101.2	30.78-30.85										
SE-T-1	B-1	0.3-1.4	0.09-0.53					100	98	95	92	88	
SE-T-2	B-1	0.1-1.0	0.03-0.30						100	98	96	92	
	B-3	7.0-8.0	2.13-2.44					100	89	60	34	8	
SE-T-3	B-1	0.1-0.8	0.03-0.24										
SE-T-4	B-1	0.5-1.0	0.15-0.30				100	98	97	91	81	75	
SE-T-5	B-1	0.5-1.5	0.15-0.46					100	93	91	84	78	
SE-T-7	B-1	0.3-1.5	0.09-0.46						100	99	96	93	
SE-P-1	B-1	0.3-1.0	0.09-0.30					100	96	90	82	78	
	B-2	2.3-3.0	0.70-0.91						100	93	88	86	
SE-P-3	B-1	0.0-1.0	0.00-0.30							100	92	84	
SE-P-4	b-1	0.0-1.0	0.00-0.30						100	97	91	84	
SE-P-7	b-1	0.3-1.0	0.09-0.30					100	95	79	64	55	
SE-P-8	b-1	0.3-1.0	0.09-0.30						100	93	78	64	
SE-P-11	B-1	0.3-1.0	0.09-0.30										
SE-P-13	b-1	0.3-0.8	0.09-0.24										
SE-P-14	B-1	0.3-1.0	0.09-0.30					100	94	87	79	72	
SE-P-16	b-1	0.3-1.0	0.09-0.30						100	90	84	76	
SE-P-17	B-1	1.0-2.0	0.30-0.61						100	94	89	85	
SE-P-23	b-1	0.3-1.0	0.09-0.30						100	90	82	74	
SE-P-25	B-1	0.1-1.5	0.03-0.46										
SE-P-26	B-1	0.3-1.0	0.09-0.30						100	96	94	91	

NOTES:

(a) Sample types

SS - Standard split spoon

P - Pitcher

D - Fugro Drive

B, b - Bulk

(b) NP - Not Plastic

(c) USCS - Unified Soil Classification System

(d) * Indicates that test has been performed
and results are included in this report

STANDARD SIEVE NO.						PARTICLE SIZE (mm)		ATTERBERG LIMITS (b)			USCS (c)	IN-SITU					COMPACTED			SPECIFIC GRAVITY OF SOLIDS	TRIAxIAL (d)	UNCONFINED COMPRESSION
SAND			SILT OR CLAY			LL	PL	PI	DRY UNIT WEIGHT			MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)					
40	100	200	.005	.001	(pcf)				(kg/m ³)	(pcf)					(kg/m ³)							
10	23	14	9						SW-SM	117.1	1876	9.9	60.9	0.44								
									SW-SM	141.1	2260	4.9	68.9	0.19								
									SW-SM	127.5	2042	5.7	48.1	0.32								
8	80	39	27					NP	SM							127.8	2047	9.6				
2	86	73	60			23	18	5	CL-ML							122.9	1969	12.8				
8	1	0	0						GP													
			33			28	21	7	SC-SM													
75	67	57	47			21	18	3	SM							127.0	2034	10.3				
78	72	47	28						SM													
93	84	58	24						SM													
78	68	25	13						SM													
96	79	48	38						SM													
84	72	43	28						SM													
84	69	47	30						SM													
55	46	37	26						SM													
54	52	44	32						SM											2.64		
			64			38	21	17	CL													
									SM													
72	62	46	25					NP	SM													
76	56	45	29						SM													
5	72	40	23						SM													
4	58	42	30						SM													
	100	96	53					NP	ML													
1	86	61	36						SM													

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NOTES:

(c) USCS - Unified Soil Classification System

(d) * Indicates that test has been performed

and results are included in this report

B, b - Bulk

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	40	100	200	.005	.001	LL	PL	PI		(pcf)	(kg/m ³)	MO	CO	SAT	VO	RA	(pcf)	(kg/m ³)	OF	MC	SP	GR	OF	TR	UN	CO
4	77	59	32						SM																	
									SM																	
6	78	51	35						SM																	
9	41	27	20						GM																	
7	53	44	36					NP	SM																	
									SM																	
									CL																	
									GM																	
8	51	44	40			52	33	18	GM																	
6	64	49	35						SM																	
1	69	52	35						SM																	
									SM																	
5	71	38	30						SM																	
2	70	35	24						SM																	
6	55	33	26						SM																	
			53			27	17	10	CL																	
0	72	57	43						SC																	
6	67	35	19						SM																	
4	26	22	15						GM																	

SUMMARY
VERIFICATION

MX SITING
DEPARTMENT OF

FUBRO

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[illegible]

**SUMMARY OF LABORATORY TEST RESULTS
VERIFICATION SITE, SNAKE EAST CDP, UTAH**

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

TABLE
9-1
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FUGRO NATIONAL, INC.

AFY-01

SUMMARY OF TRIAXIAL COMPRESSION TEST RESULTS

VERIFICATION SITE, SNAKE EAST CDP, UTAH

TABLE
9-2

AFV-10

[illegible]

SUMMARY OF UNCONFINED COMPRESSION TEST RESULTS VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMS0

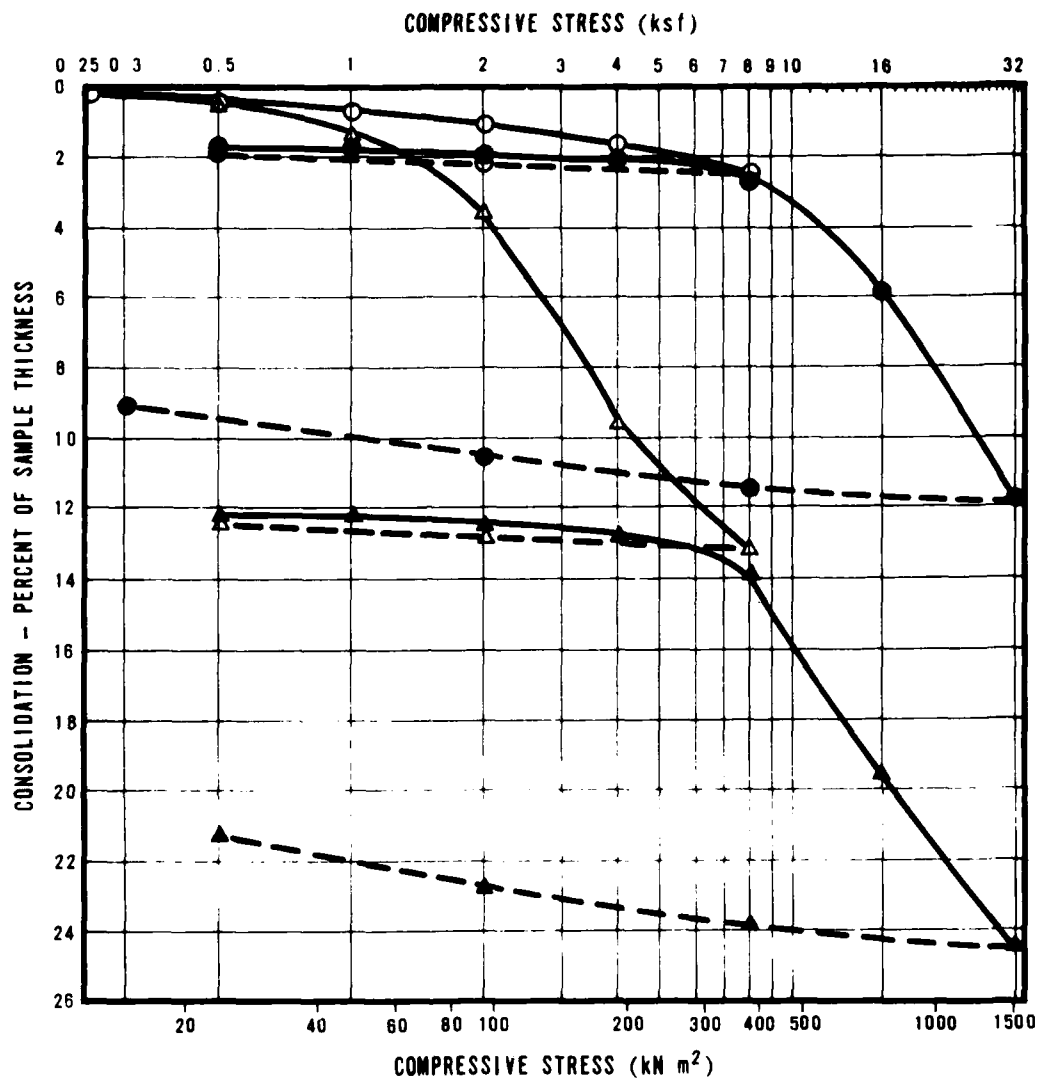
**TABLE
9-3**

MARR NATIONAL, INC.

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MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMS0

FUGRO NATIONAL, INC.



SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	INITIAL DRY DENSITY		INITIAL MOISTURE CONTENT (%)	INITIAL VOID RATIO	INITIAL DEGREE OF SATURATION (%)
			FEET	METERS		pcf	kg. m ³			
○	SE-B-2	P-8	24.0-24.8	7.32-7.56	ML	81.9	1311	35.1	1.06	89.6
△	SE-B-4	P-4	12.0-12.9	3.65-3.93	CL-ML	73.0	1169	28.3	1.31	58.4

- AT FIELD MOISTURE
- AFTER ADDITION OF WATER
- COMPRESSION
- - - REBOUND

CONSOLIDATION TEST RESULTS
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMS0

FIGURE
9-1

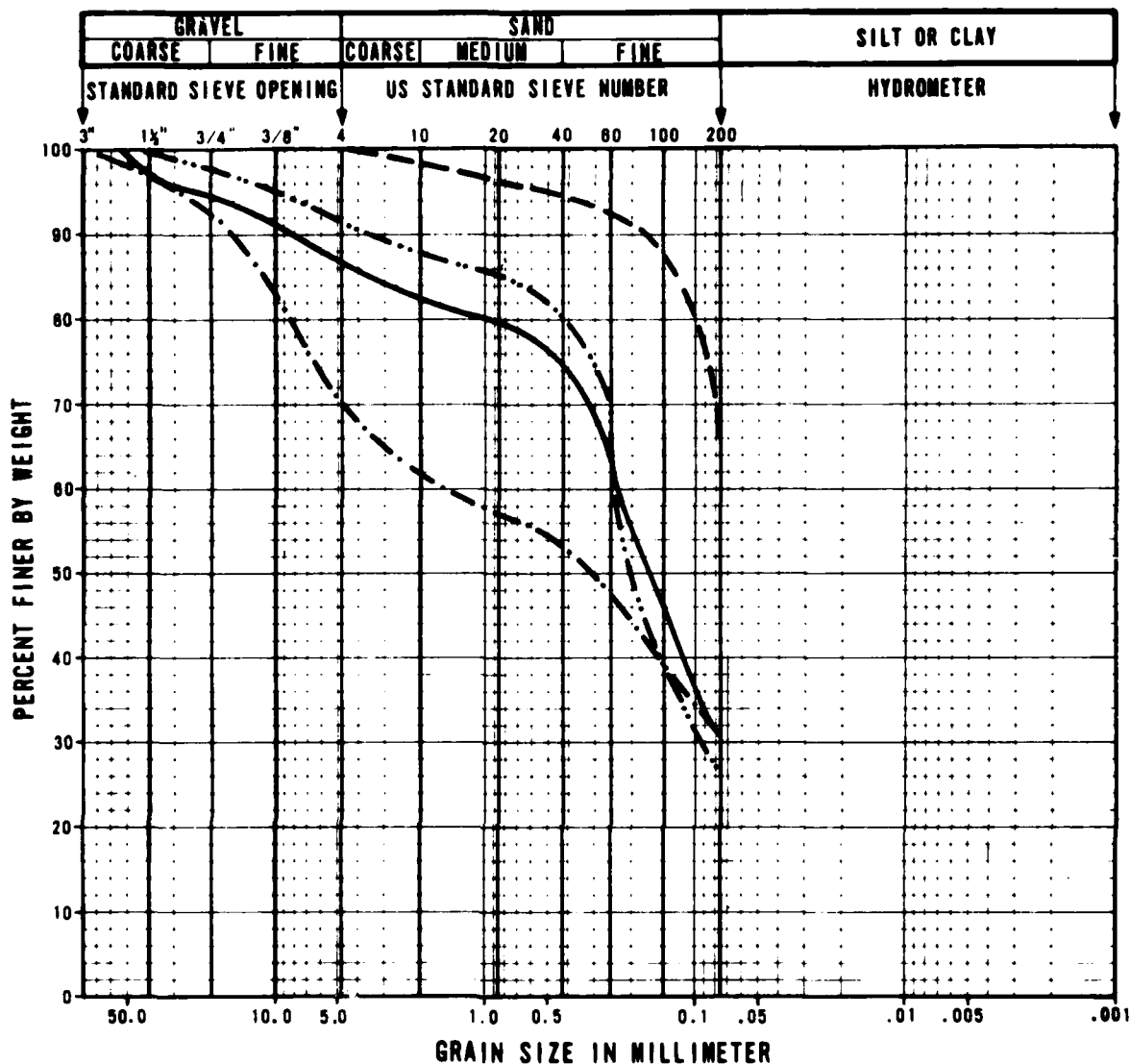
FURRO NATIONAL, INC.

**SUMMARY OF CHEMICAL TEST RESULTS
VERIFICATION SITE, SNAKE EAST CDP, UTAH**

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMS0

**TABLE
9-5**

FURRO NATIONAL, INC.



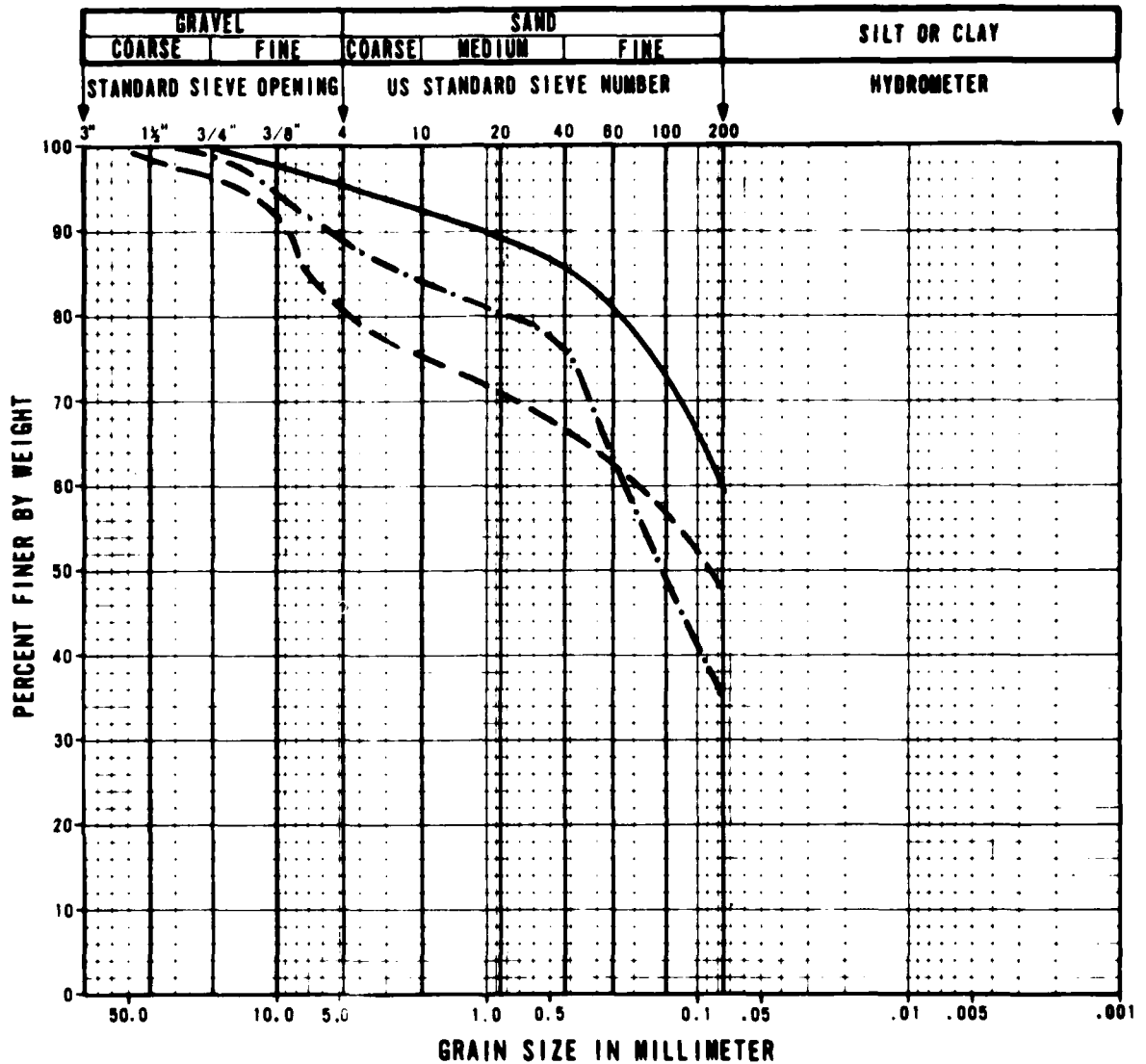
SYMBOL	COMPOSITE SAMPLE NUMBER	ACTIVITY NUMBER	SAMPLE INTERVAL		SOIL TYPE
			FEET	METERS	
—	A	SE-P-26	0.3-1.0	0.09-0.30	SM
—		SE-P-1	0.3-1.0	0.09-0.30	
---	B	SE-P-11	0.3-1.0	0.09-0.30	CL-ML
---		SE-P-25	1.0-1.5	0.30-0.46	
-.-	C	SE-CS-28	0.5-2.0	0.15-0.61	SC-SM
-.-		SE-CS-3	0.0-2.0	0.00-0.61	
-.-	D	SE-T-1	0.3-1.4	0.09-0.43	SM

GRAIN SIZE CURVES, CBR TESTS
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
9-2
1 OF 2

INSTRUMENTAL NATIONAL INC.



SYMBOL	COMPOSITE SAMPLE NUMBER	ACTIVITY NUMBER	SAMPLE INTERVAL		SOIL TYPE
			FEET	METERS	
—	E	SE-T-2	0.1-1.0	0.03-0.30	CL-ML
---	F	SE-T-4	0.5-1.0	0.15-0.30	SM
-.-	G	SE-T-5	0.0-1.0	0.00-0.30	SM
		SE-P-3	0.0-1.0	0.00-0.30	SM

GRAIN SIZE CURVES, CBR TESTS
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMS0

FIGURE
9-2
2 OF 2

INSTRON NATIONAL INC.

CHECKED BY _____ APPROVED BY _____

COMPOSITE SAMPLE NUMBER	SOIL TYPE	PERCENT PASSING #200	ATTERBERG LIMITS		SPECIFIC GRAVITY	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)	COMPACTED DRY DENSITY		COMPACTED MOISTURE (%)	PERCENT OF MAXIMUM DRY DENSITY	CBR (%)
			LL	PI		pcf	kg/m ³		pcf	kg/m ³			
A	SM	29		NP		132.3	2119	7.5	118.6	1899	6.9	89.6	40
									113.3	1815	6.7	85.6	10
B	CL-ML	66	20	4		119.5	1914	14.0	117.5	1884	14.2	98.4	29
									109.4	1753	14.0	91.6	14
									99.1	1588	13.8	82.9	3
C	SC-SM	30	33	9		131.0	2088	9.0	125.5	2011	8.8	95.8	73
									118.4	1897	9.2	90.4	19
									112.9	1809	9.2	86.2	11
D	SM	27		NP		127.8	2047	9.6	120.1	1925	9.7	94.0	34
									110.7	1774	9.7	86.6	8
									105.6	1693	9.1	82.7	2

CALIFORNIA BEARING RATIO (CBR) TEST RESULTS
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMS0

TABLE
9-6
1 OF 2

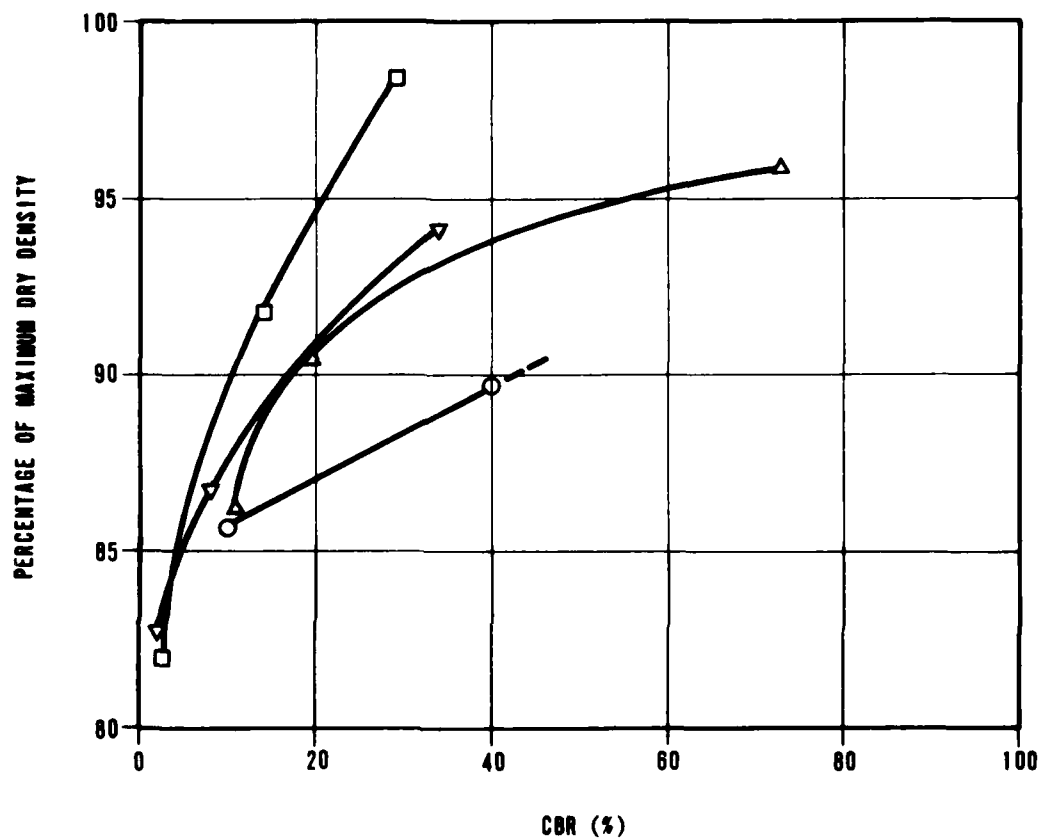
FURRO NATIONAL, INC.

CHECKED BY _____ APPROVED BY _____

COMPOSITE SAMPLE NUMBER	SOIL TYPE	ATTERBERG LIMITS		SPECIFIC GRAVITY	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)	COMPACTED DRY DENSITY		COMPACTED MOISTURE (%)	PERCENT OF MAXIMUM DRY DENSITY	CBR (%)
		LL	PI		pcf	kg/m ³		pcf	kg/m ³			
E	CL-ML	23	5		122.9	1989	12.8	119.8	1920	12.6	97.5	42
								112.1	1796	12.7	91.2	11
								102.1	1637	12.5	83.1	4
F	SM	21	3		127.0	2034	10.3	120.6	1931	10.9	94.9	32
								114.5	1834	10.7	90.2	13
G	SM	20	2		128.2	2054	10.0	118.2	1894	8.8	92.2	33
								110.2	1765	8.8	86.0	10

CALIFORNIA BEARING RATIO (CBR) TEST RESULTS
VERIFICATION SITE, SNAKE EAST COP, UTAHMX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMS0TABLE
9-6
2 OF 2

FURRO NATIONAL, INC.



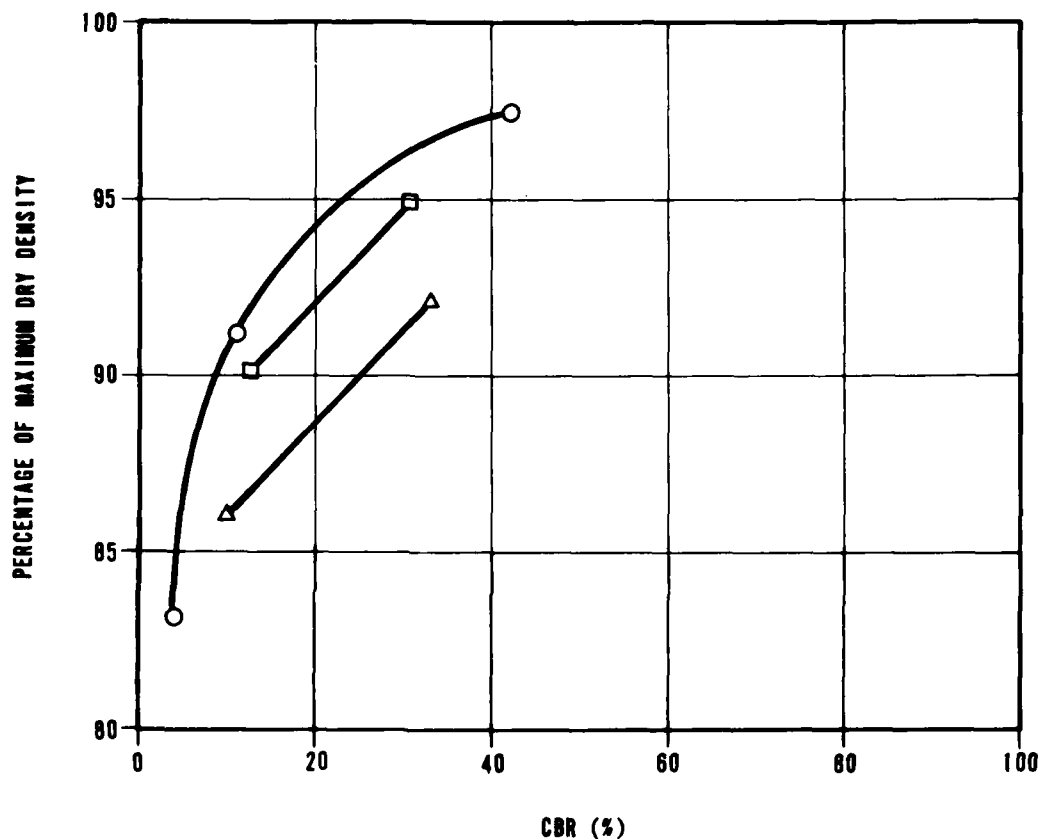
SYMBOL	COMPOSITE SAMPLE NUMBER	SOIL TYPE
○	A	SM
□	B	CL-ML
△	C	SC-SM
▽	D	SM

CALIFORNIA BEARING RATIO (CBR) CURVES
VERIFICATION SITE, SNAKE EAST CDP, UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
9-3
1 OF 2

FUGRO NATIONAL, INC.



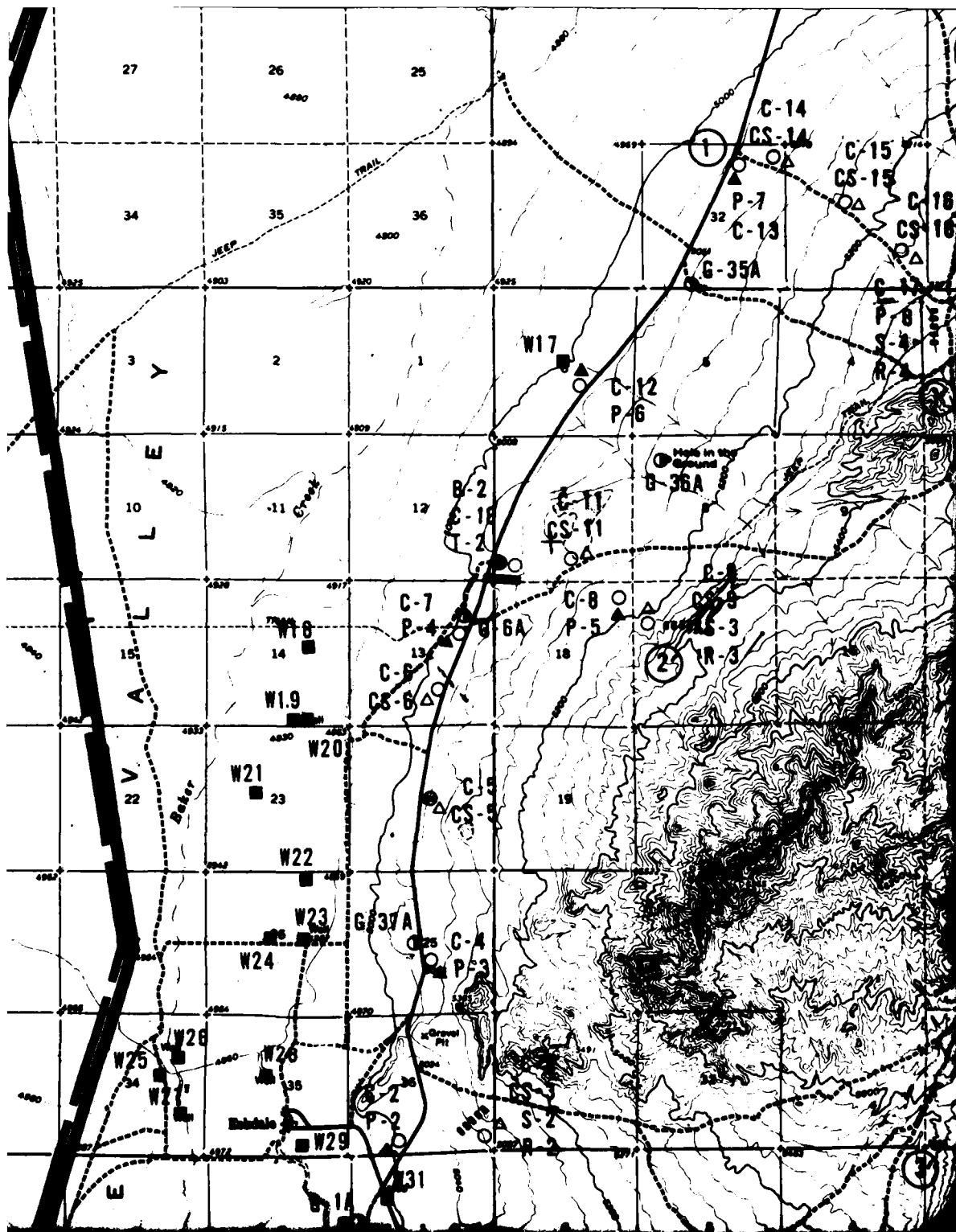
SYMBOL	COMPOSITE SAMPLE NUMBER	SOIL TYPE
○	E	CL-ML
□	F	SM
△	G	SM

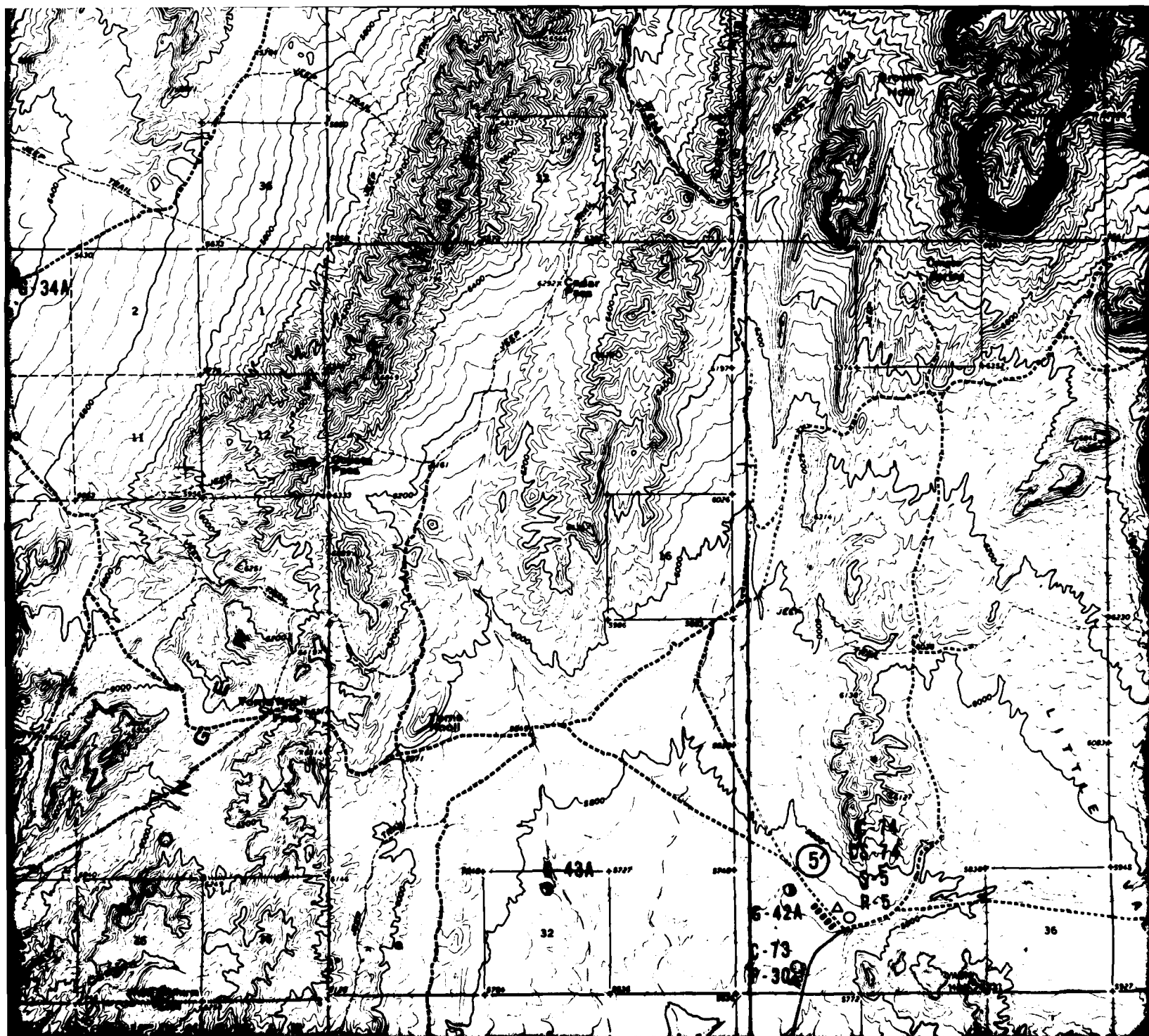
CALIFORNIA BEARING RATIO (CBR) CURVES
VERIFICATION SITE, SNAKE EAST COP, UTAH

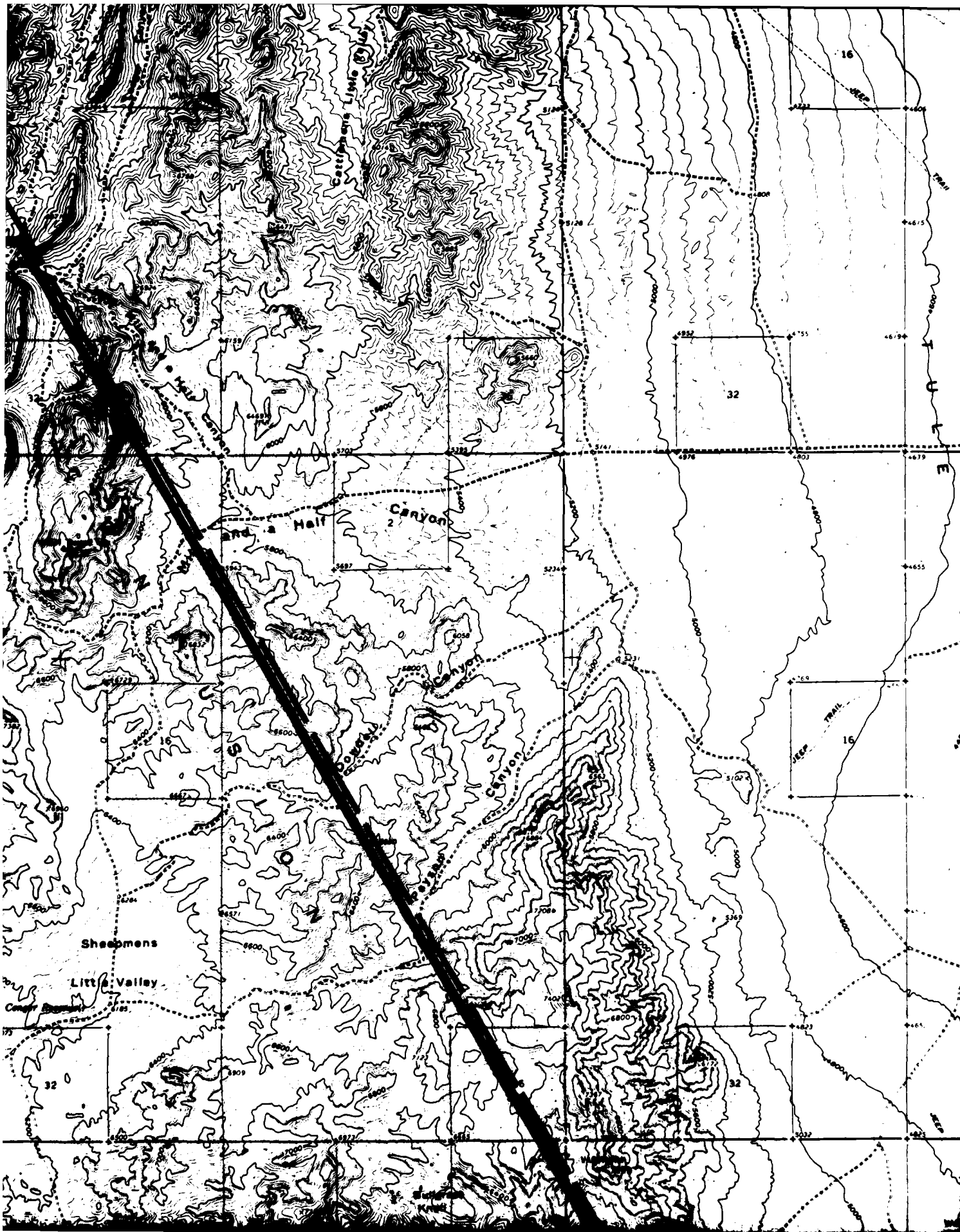
MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

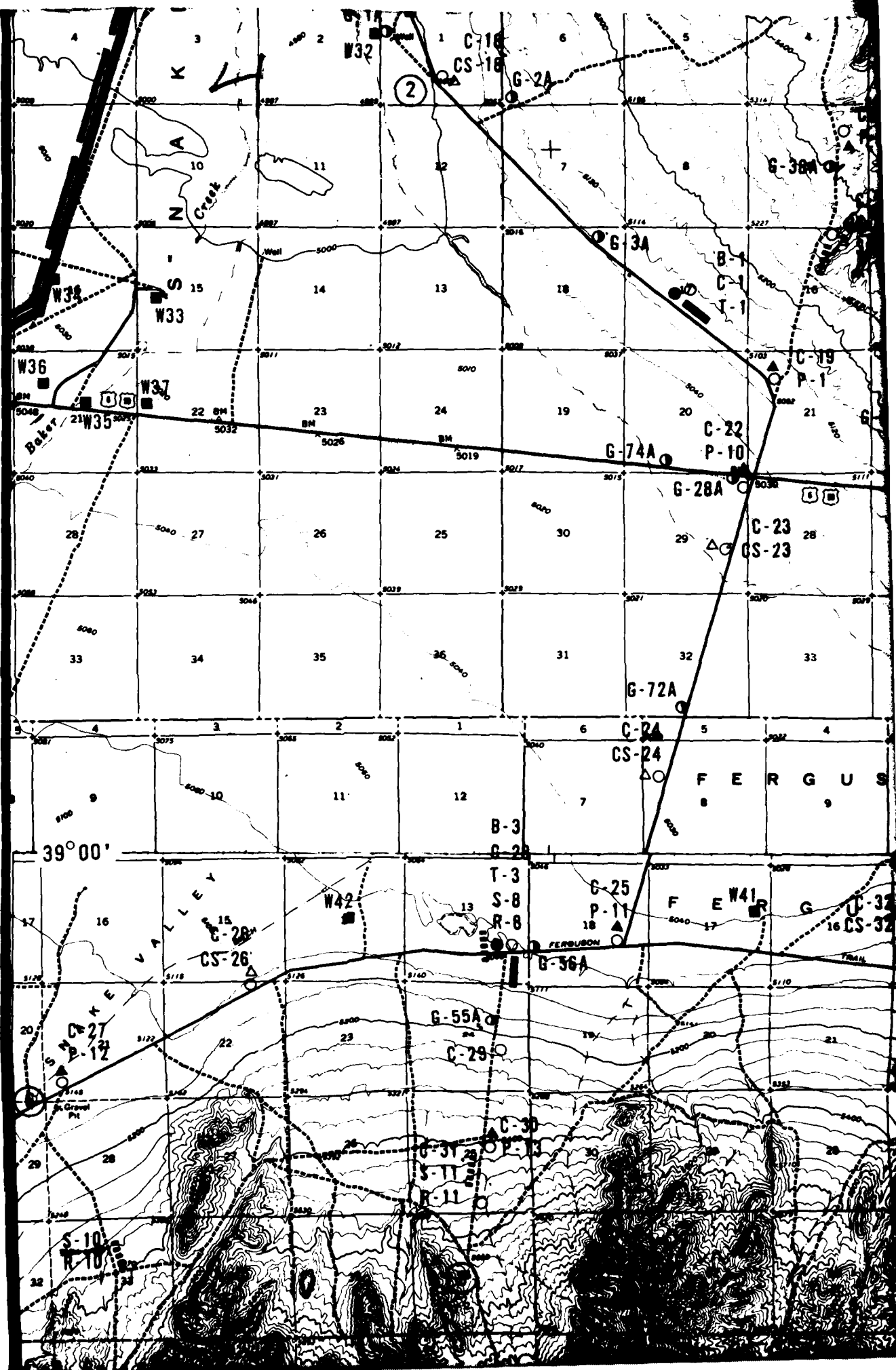
FIGURE
9-3
2 OF 2

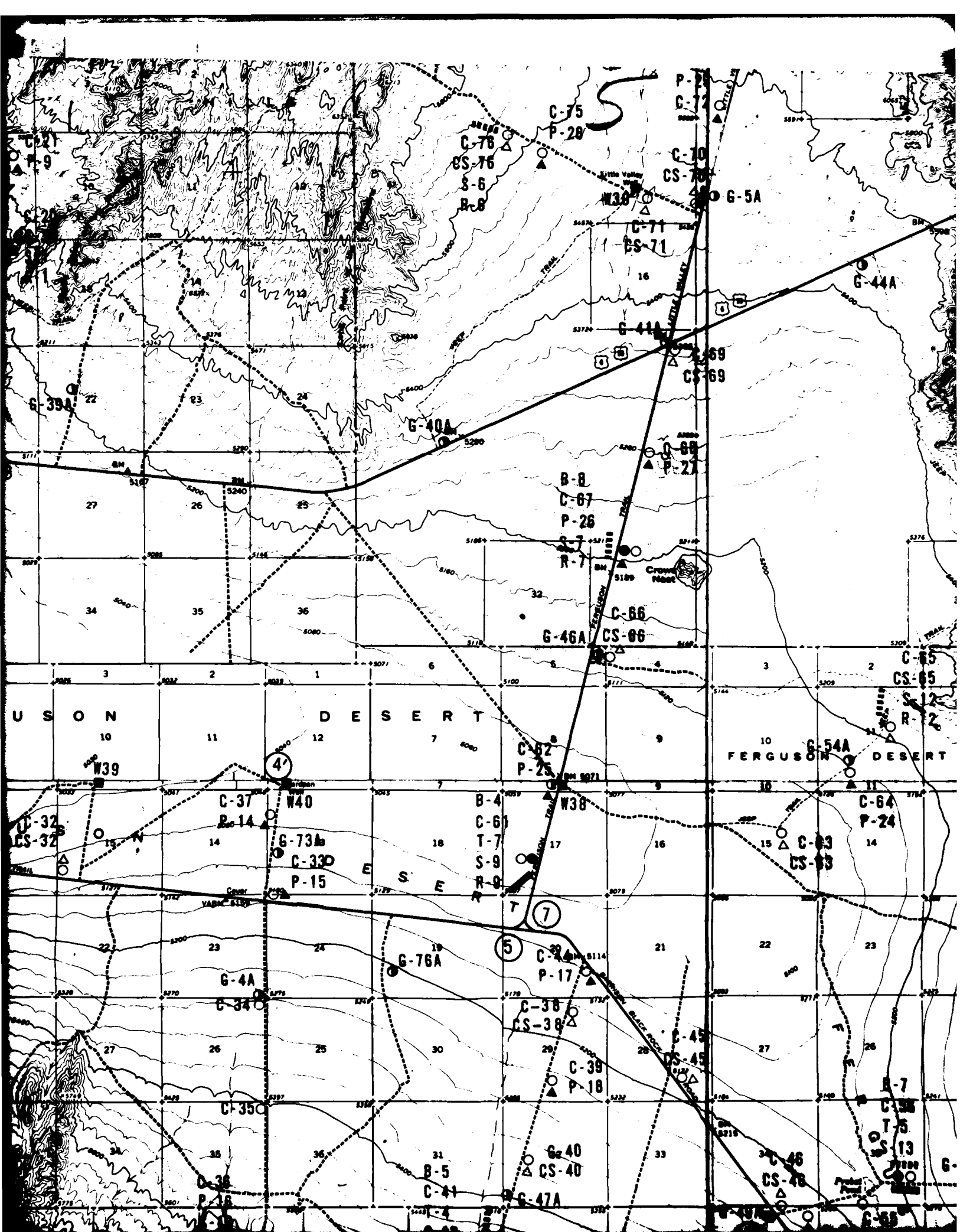
FURRO NATIONAL, INC.

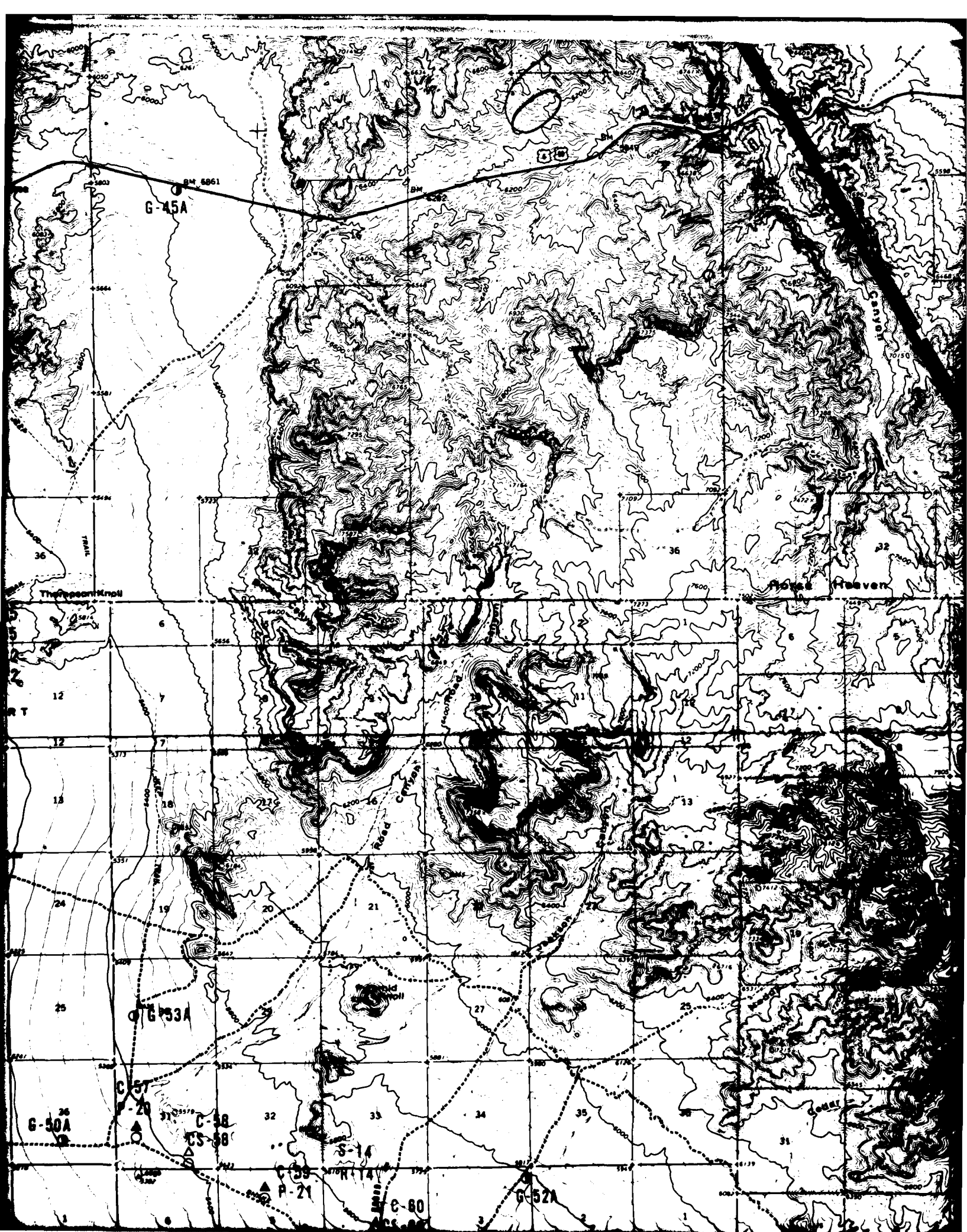


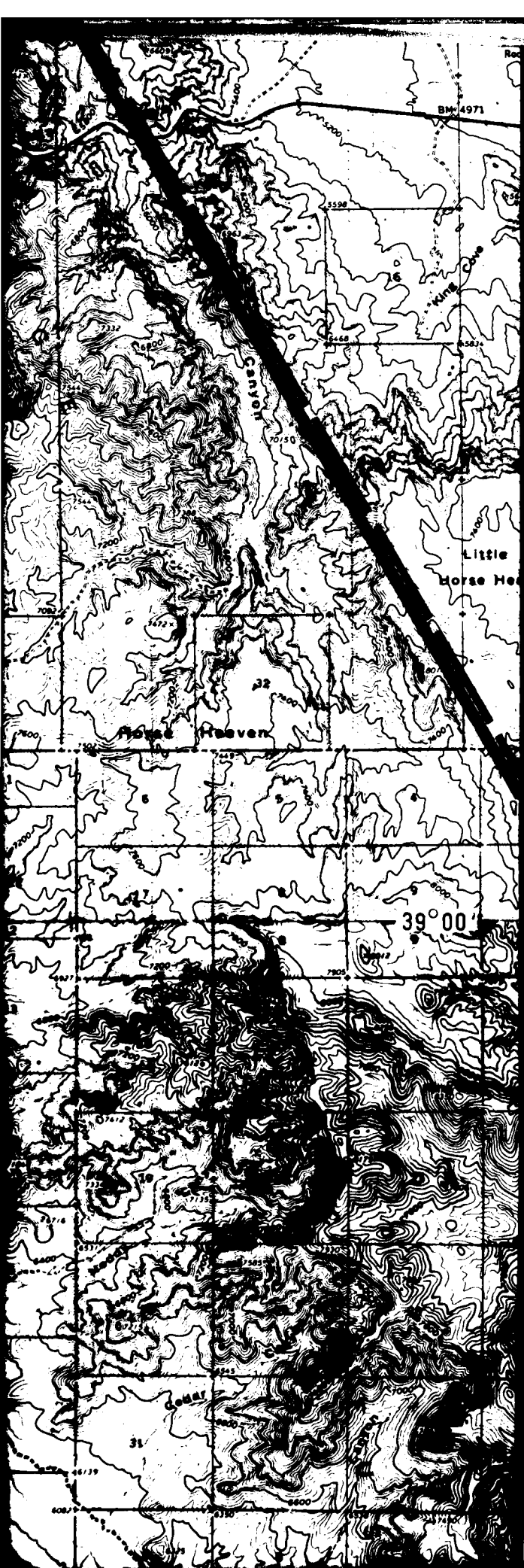




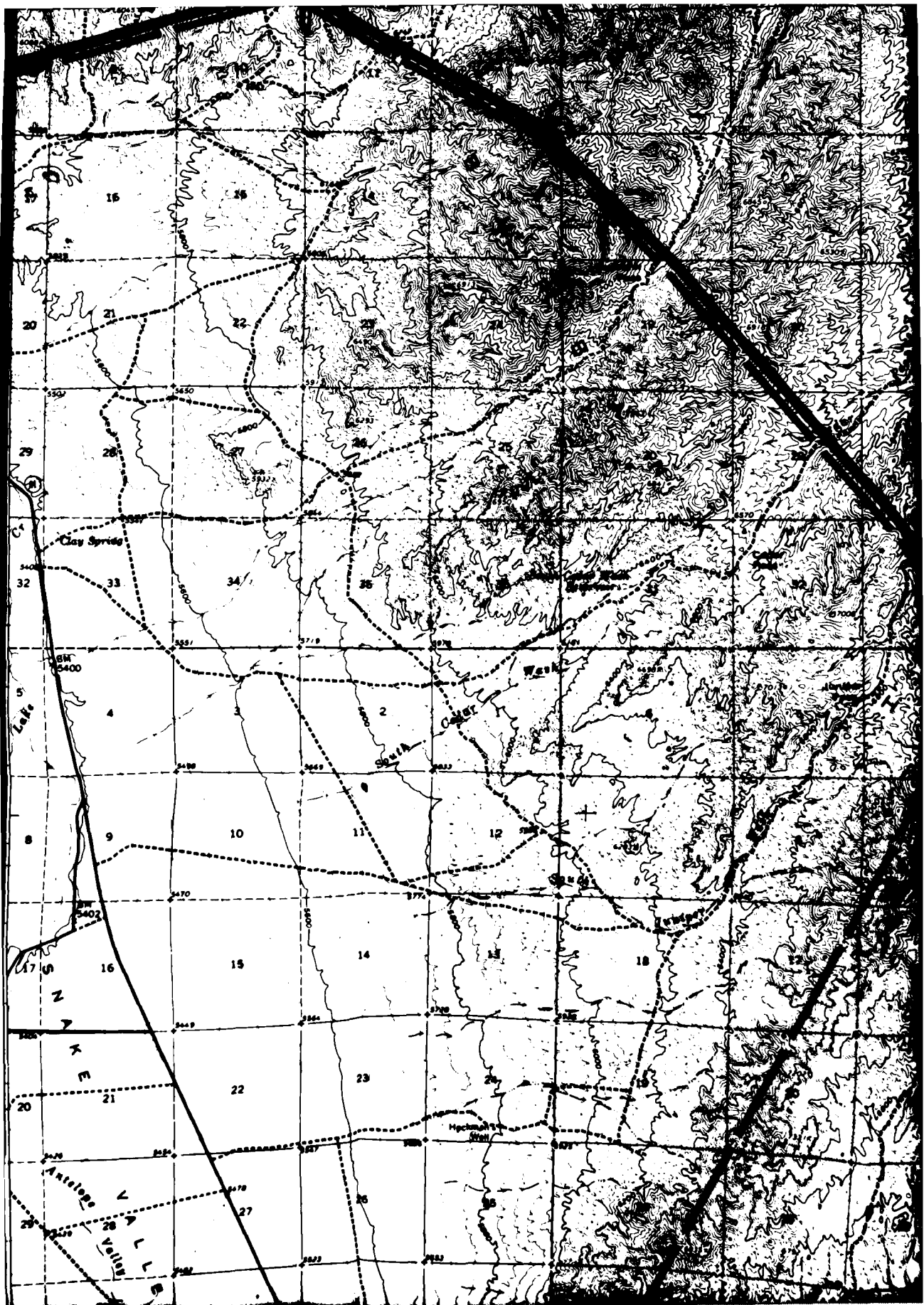


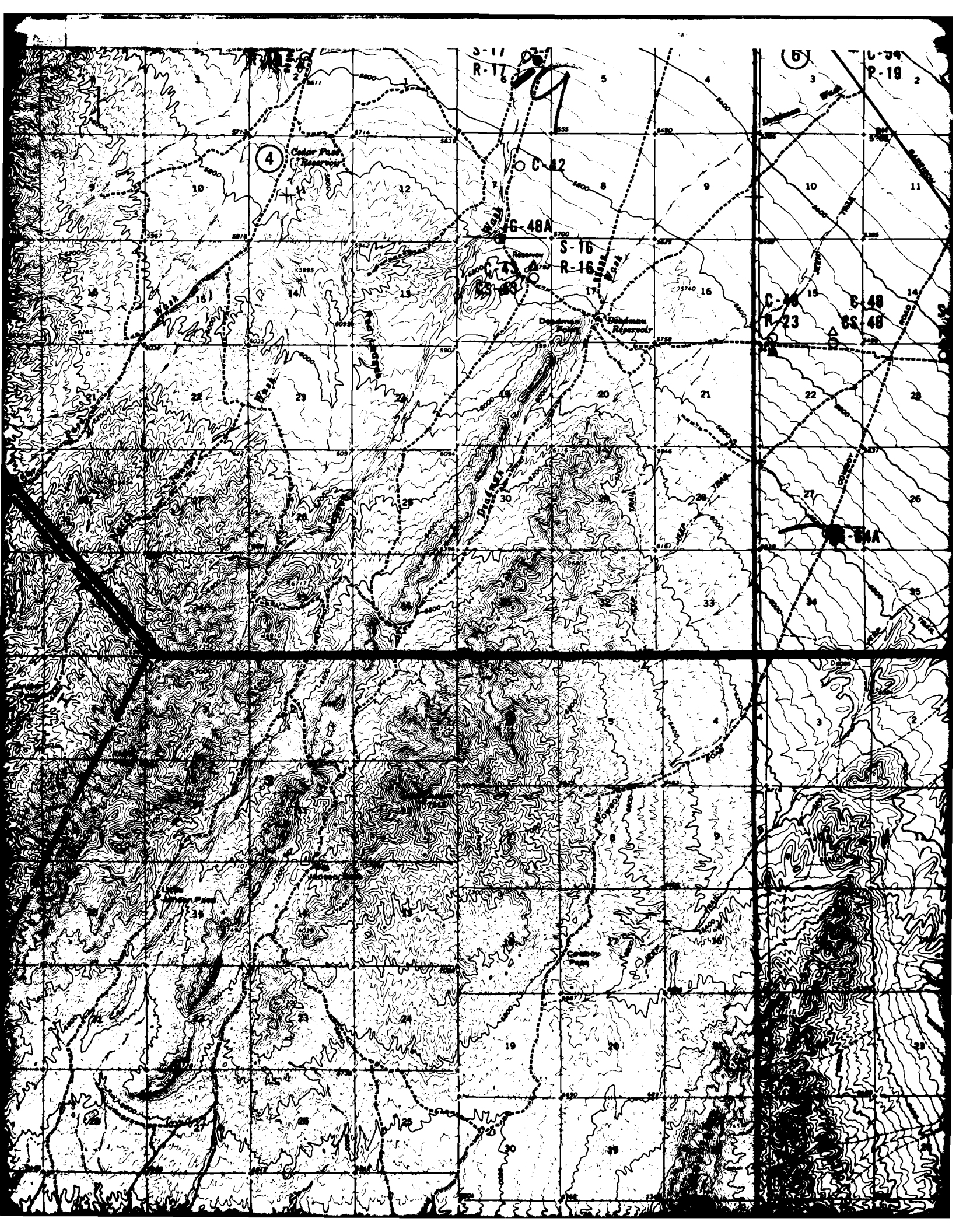


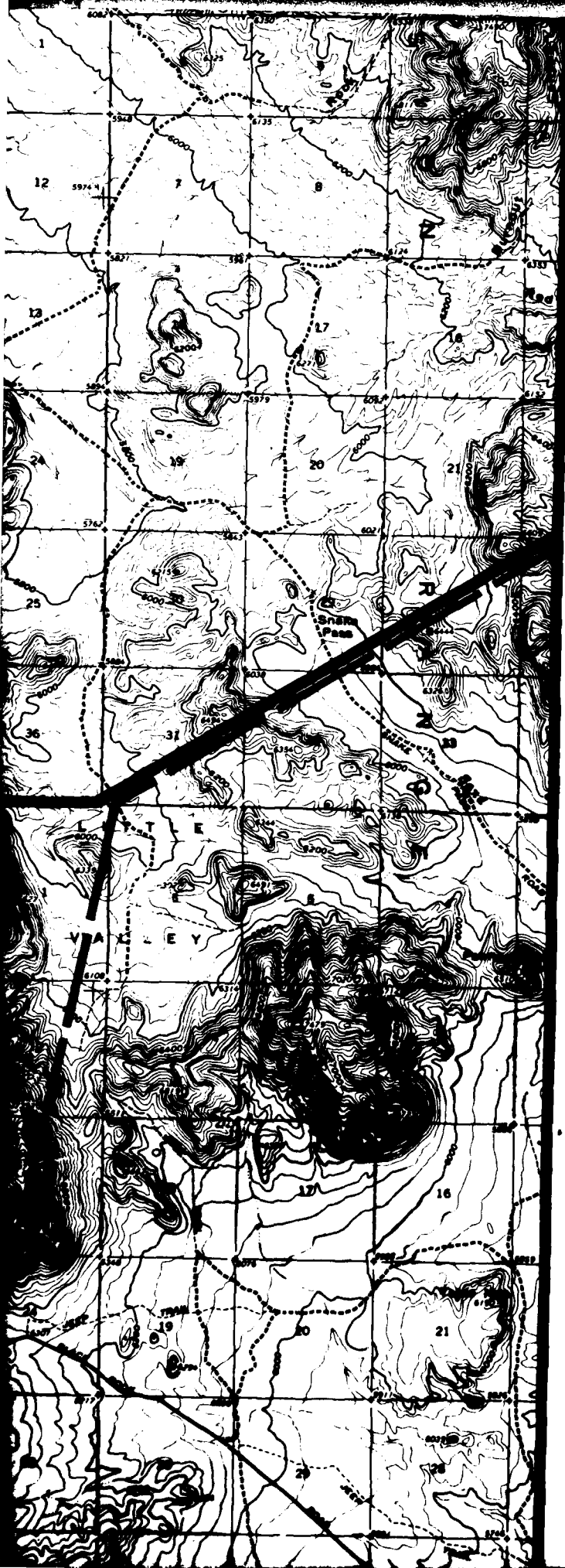




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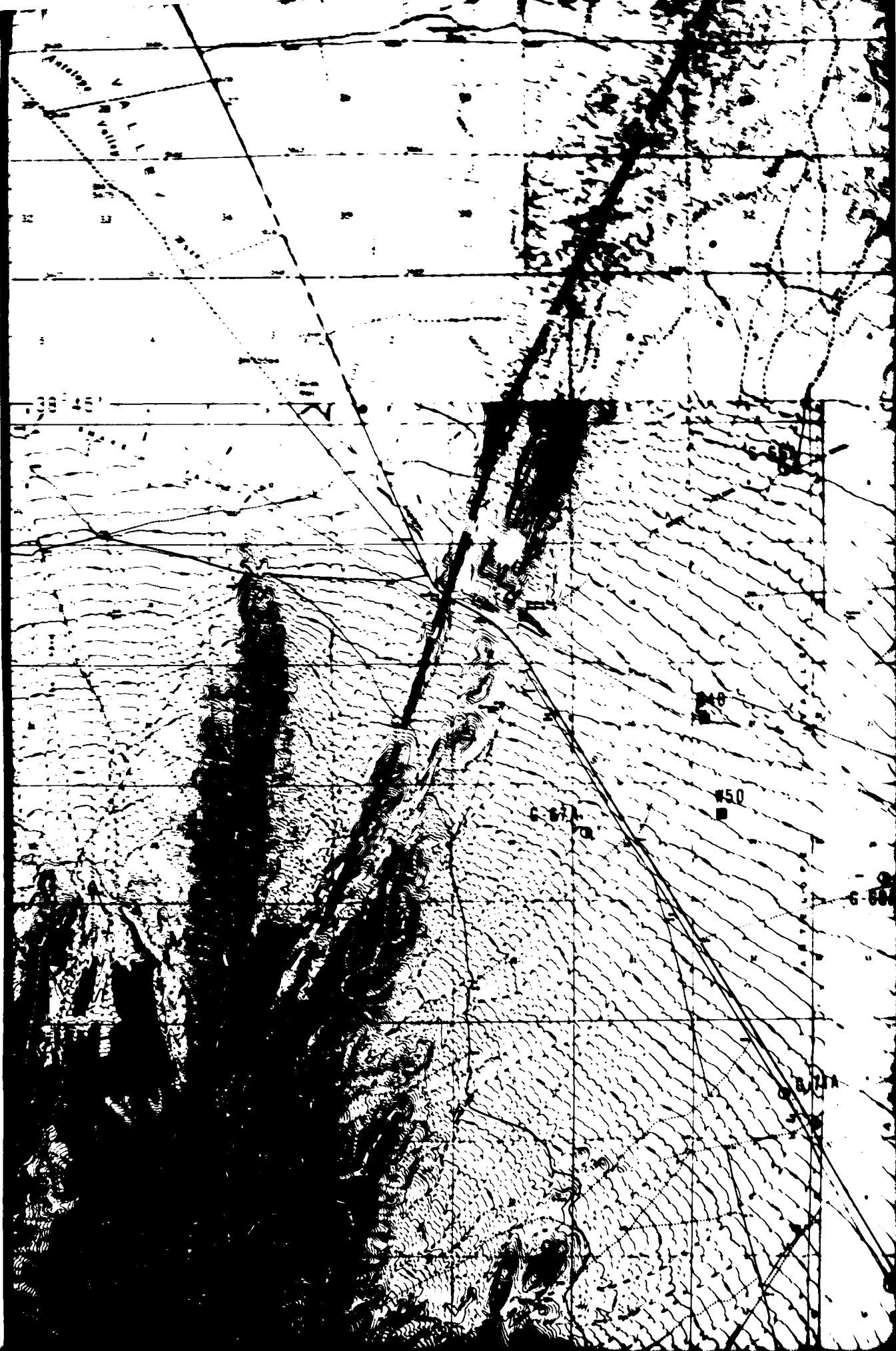


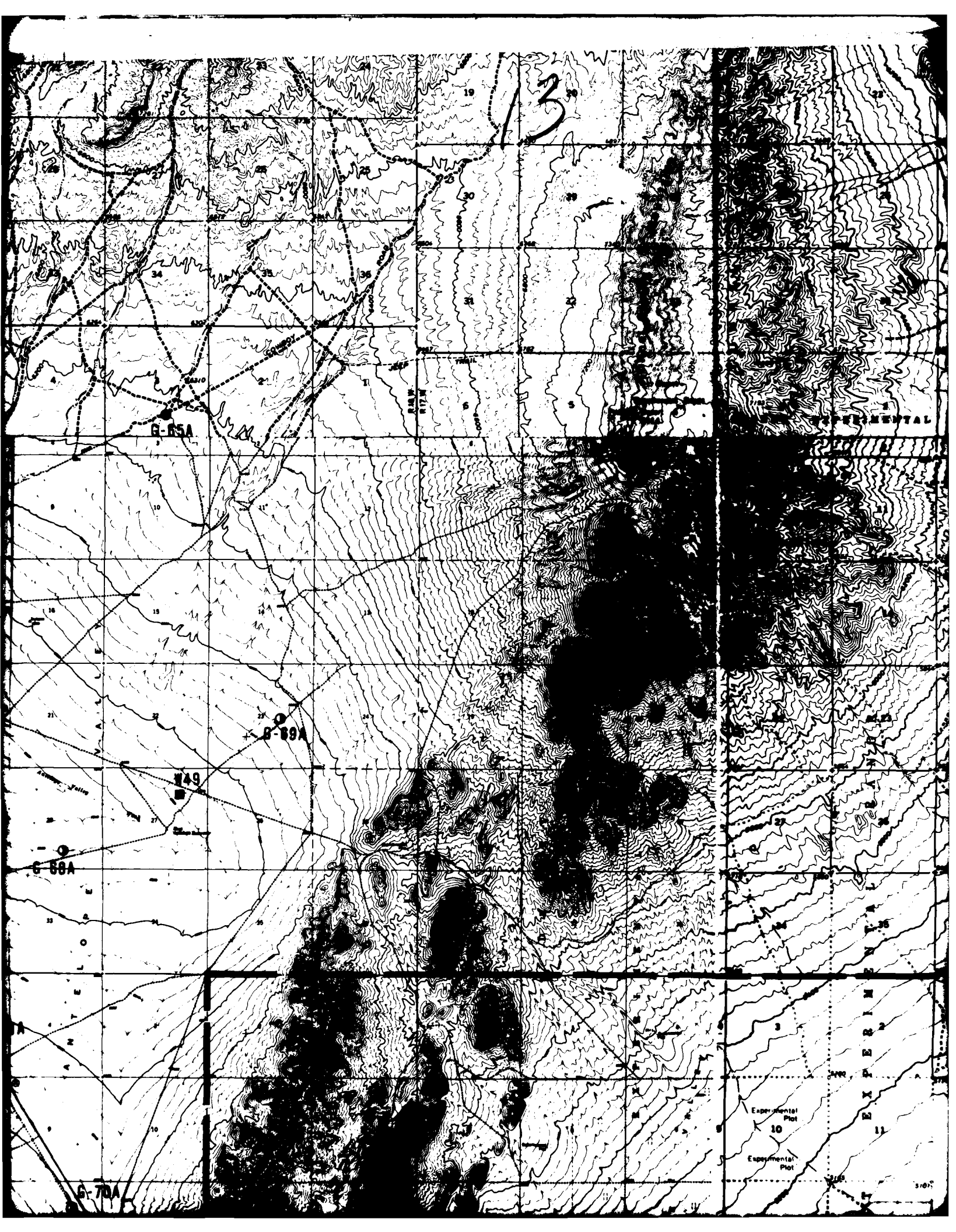




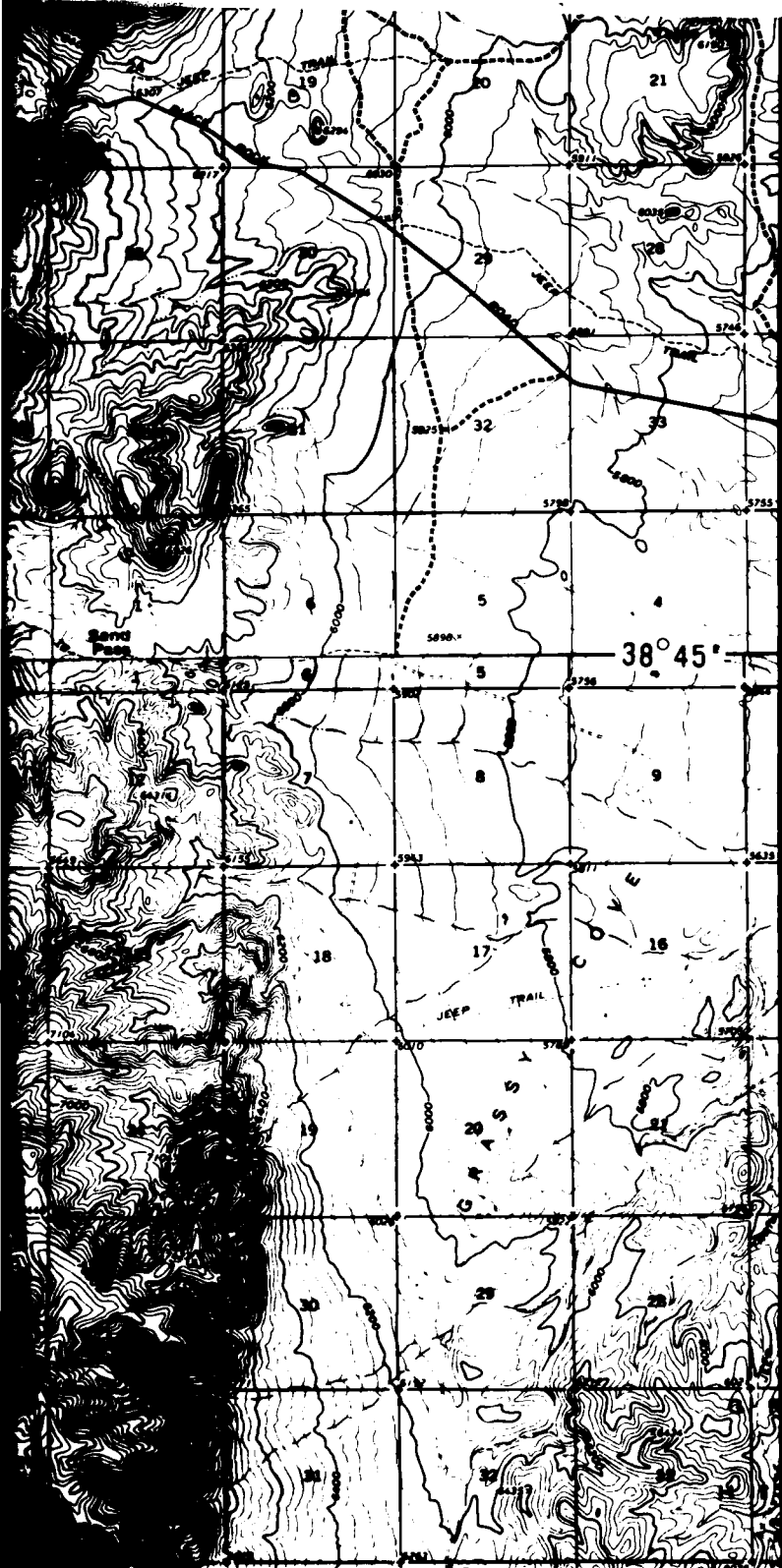
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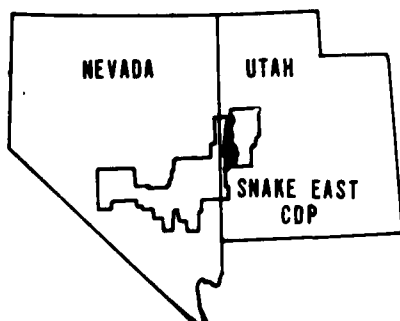


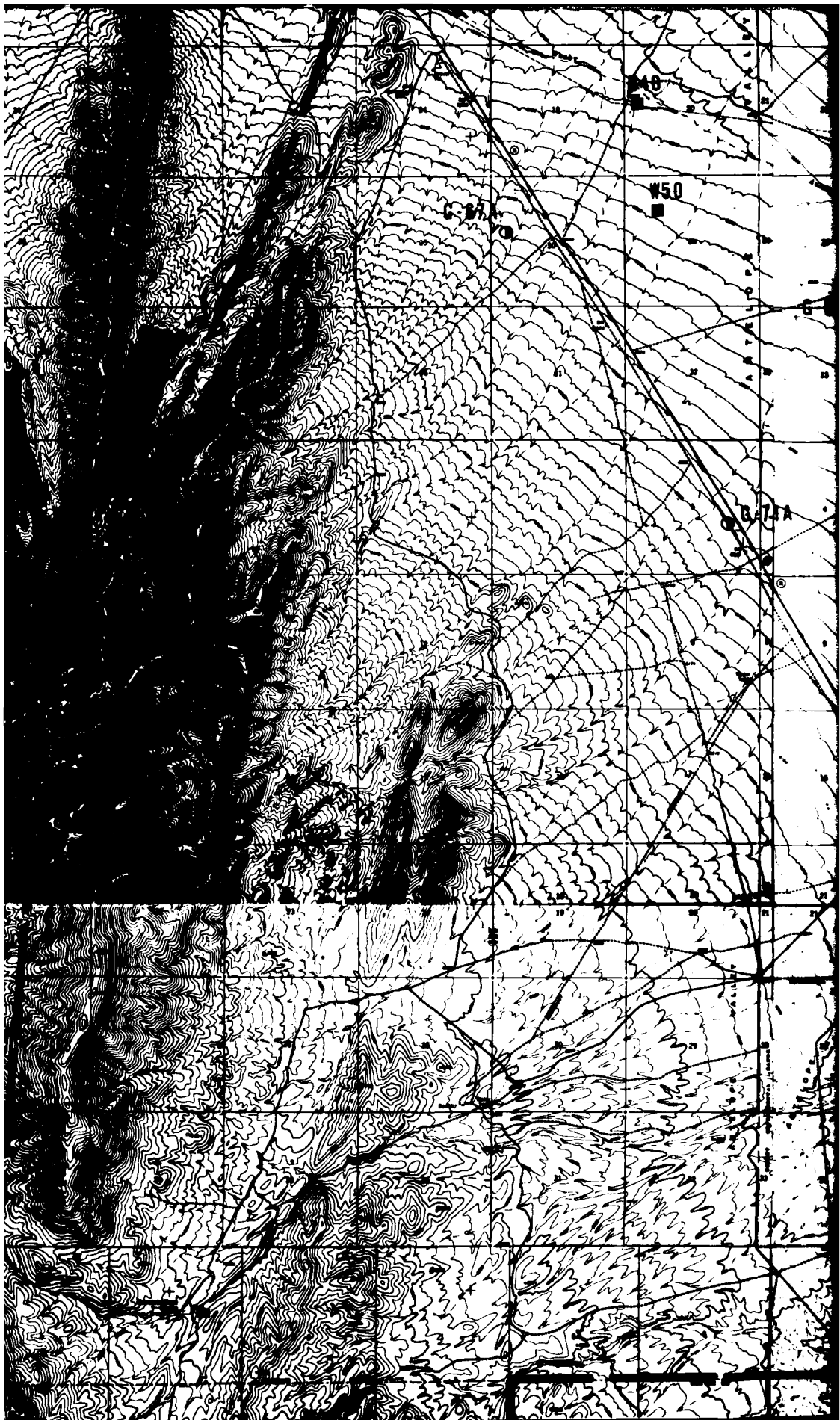


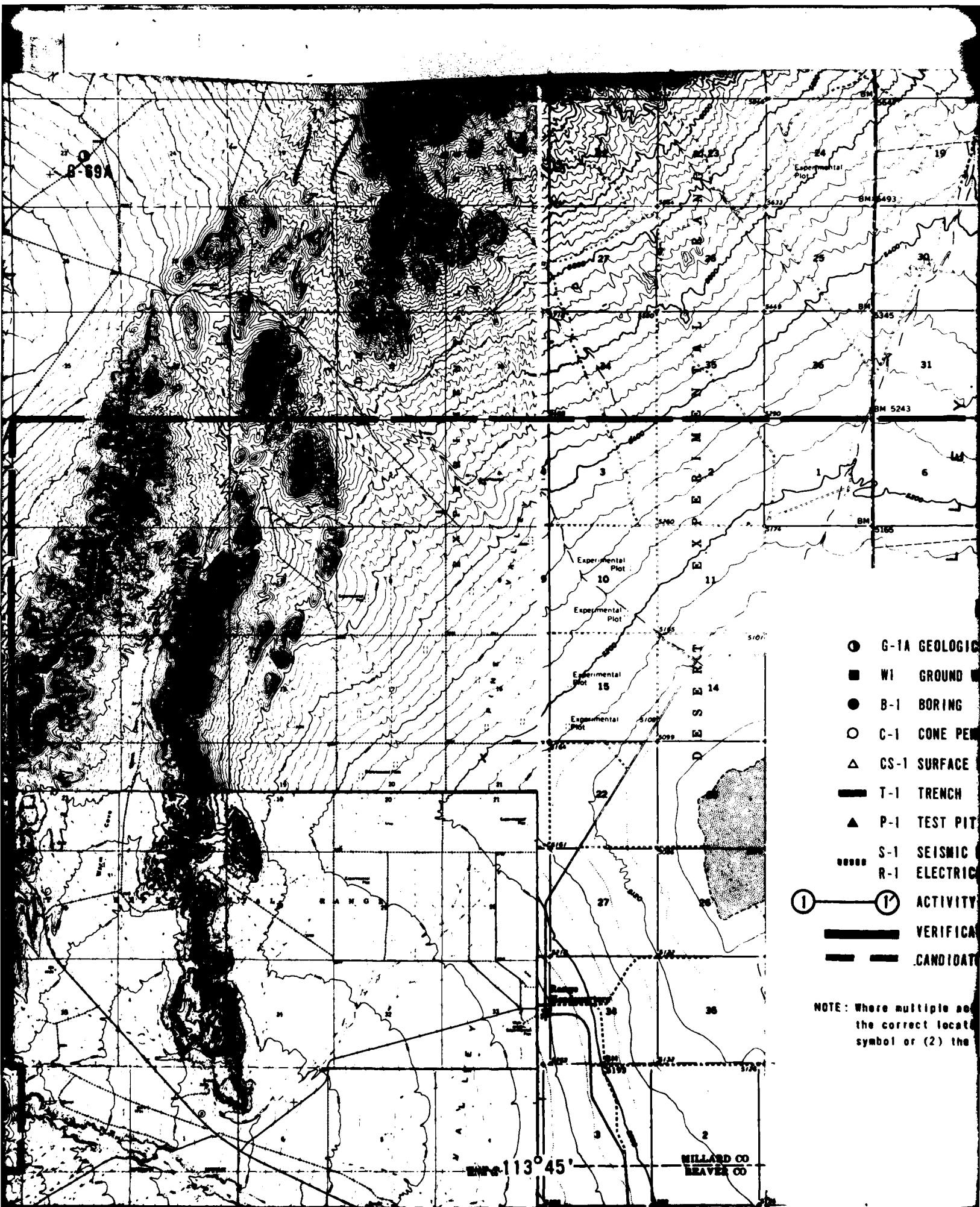
15



LOCATION MAP

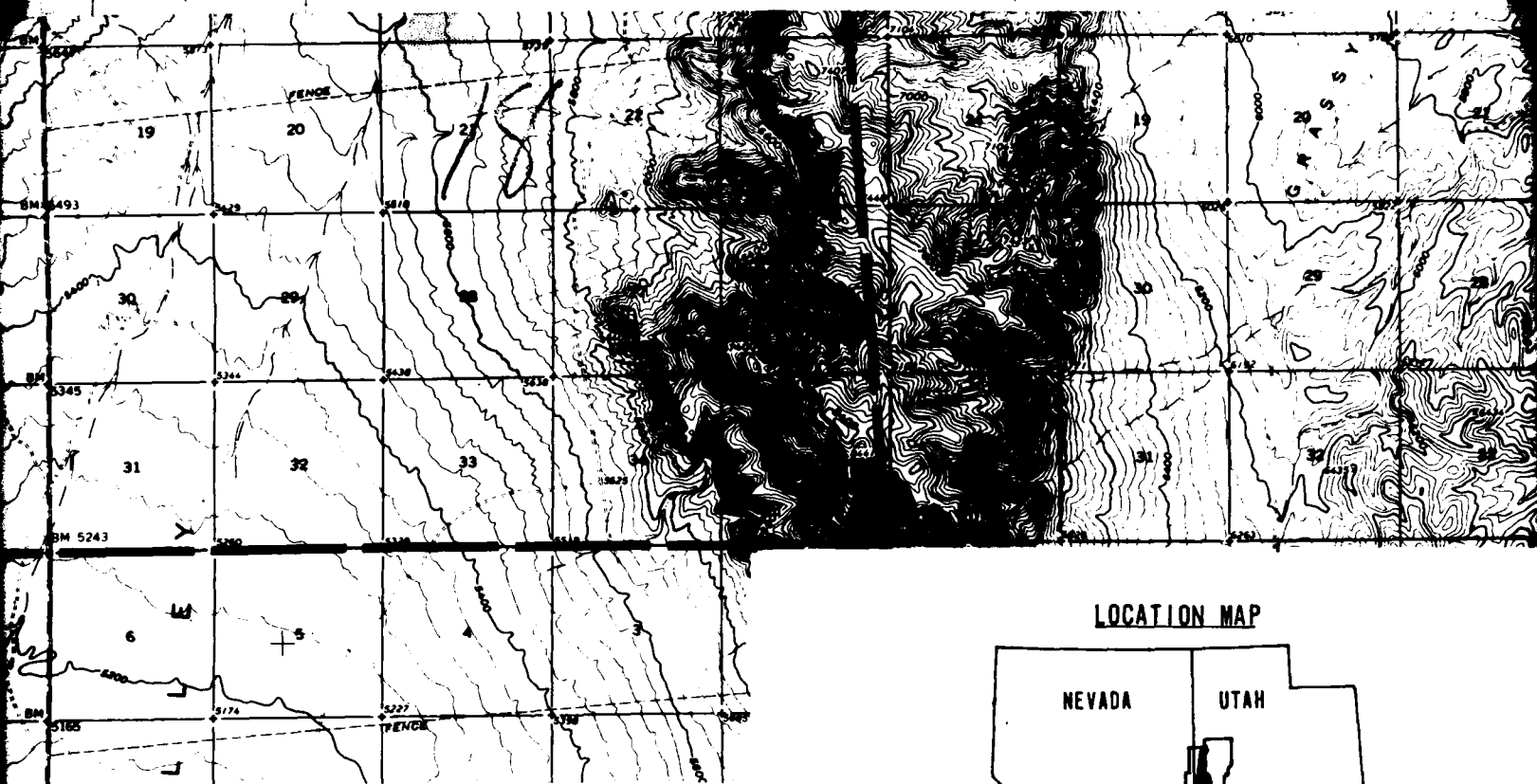






- G-1A GEOLOGIC
- WI GROUND
- B-1 BORING
- C-1 CONE PEN
- △ CS-1 SURFACE
- T-1 TRENCH
- ▲ P-1 TEST PIT
- SEISMIC
- R-1 ELECTRIC
- ① ACTIVITY
- VERIFICA
- CANDIDATE

NOTE: Where multiple are the correct locat symbol or (2) the

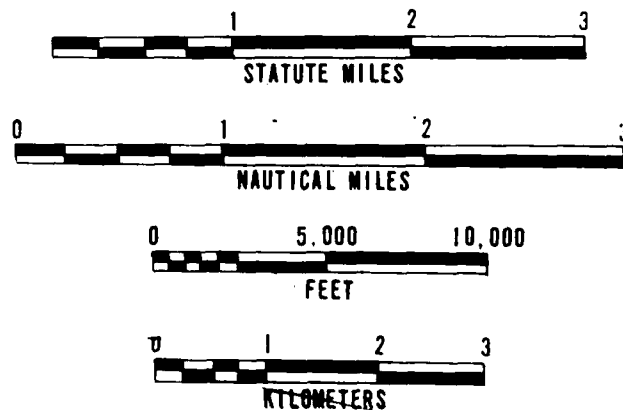
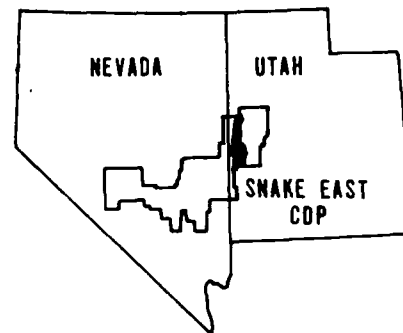


EXPLANATION

- G-1A GEOLOGIC STATION
- W1 GROUND WATER LEVEL MEASUREMENT
- B-1 BORING
- C-1 CONE PENETROMETER TEST (CPT)
- ▲ CS-1 SURFACE SAMPLE AT CPT LOCATION
- T-1 TRENCH
- ▲ P-1 TEST PIT
- S-1 SEISMIC REFRACTION LINE
- R-1 ELECTRICAL RESISTIVITY LINE
- ① ACTIVITY LINE
- VERIFICATION SITE BOUNDARY
- CANDIDATE DEPLOYMENT PARCEL (CDP) BOUNDARY

Where multiple activities were performed at the same location, the correct location is designated by either (1) the boring symbol or (2) the CPT symbol, if no boring was drilled

LOCATION MAP



ACTIVITY LOCATION MAP SNAKE EAST CDP, UTAH

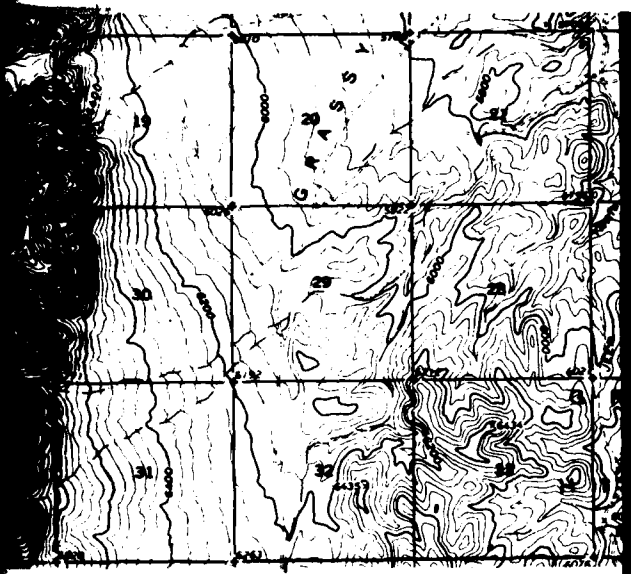
MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

DRAWING

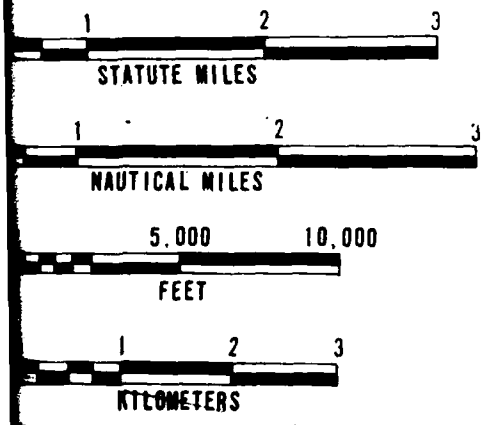
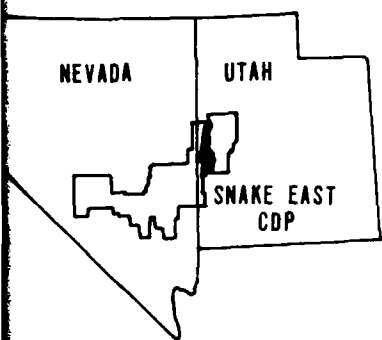
1

FUGRO NATIONAL INC

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LOCATION MAP



ACTIVITY LOCATION MAP SNAKE EAST CDP, UTAH	
INVESTIGATION THE AIR FORCE - SAMSO	DRAWING 1
NATIONAL INC.	

CONE RESISTANCE

DEPTH

(METERS)

(FEET)

0 100 200 300 400 500 600 700 800 900

0 0

1 5

2 10

0 0

1 5

2 10

3 15

0 0

1 5

2 10

0 0

1 5

0 0

1 5

2 10

0 0

1 5

C-1 SURFACE ELEVATION: 5015'
SURFICIAL GEOLOGIC UNIT: A

C-2 SURFACE ELEVATION: 5010'
SURFICIAL GEOLOGIC UNIT: A

C-3 SURFACE ELEVATION: 5080'
SURFICIAL GEOLOGIC UNIT: A

C-4 SURFACE ELEVATION: 5055'
SURFICIAL GEOLOGIC UNIT: A

C-5 SURFACE ELEVATION: 5024'
SURFICIAL GEOLOGIC UNIT: A

C-6 SURFACE ELEVATION: 5018'
SURFICIAL GEOLOGIC UNIT: A

900 (kg/cm²)
900 (tsf)

5° (1529m)
T: A5y/A4o

0° (1527m)
T: A4o

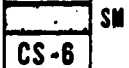
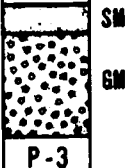
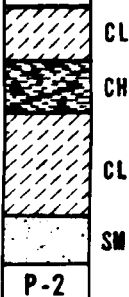
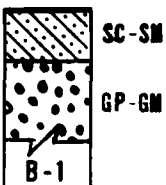
0° (1548m)
T: A5y/A4o

5° (1541m)
T: A5y

4° (1531m)
T: A5y/A4o

0° (1528m)
T: A5y/A4o

SOIL COLUMN



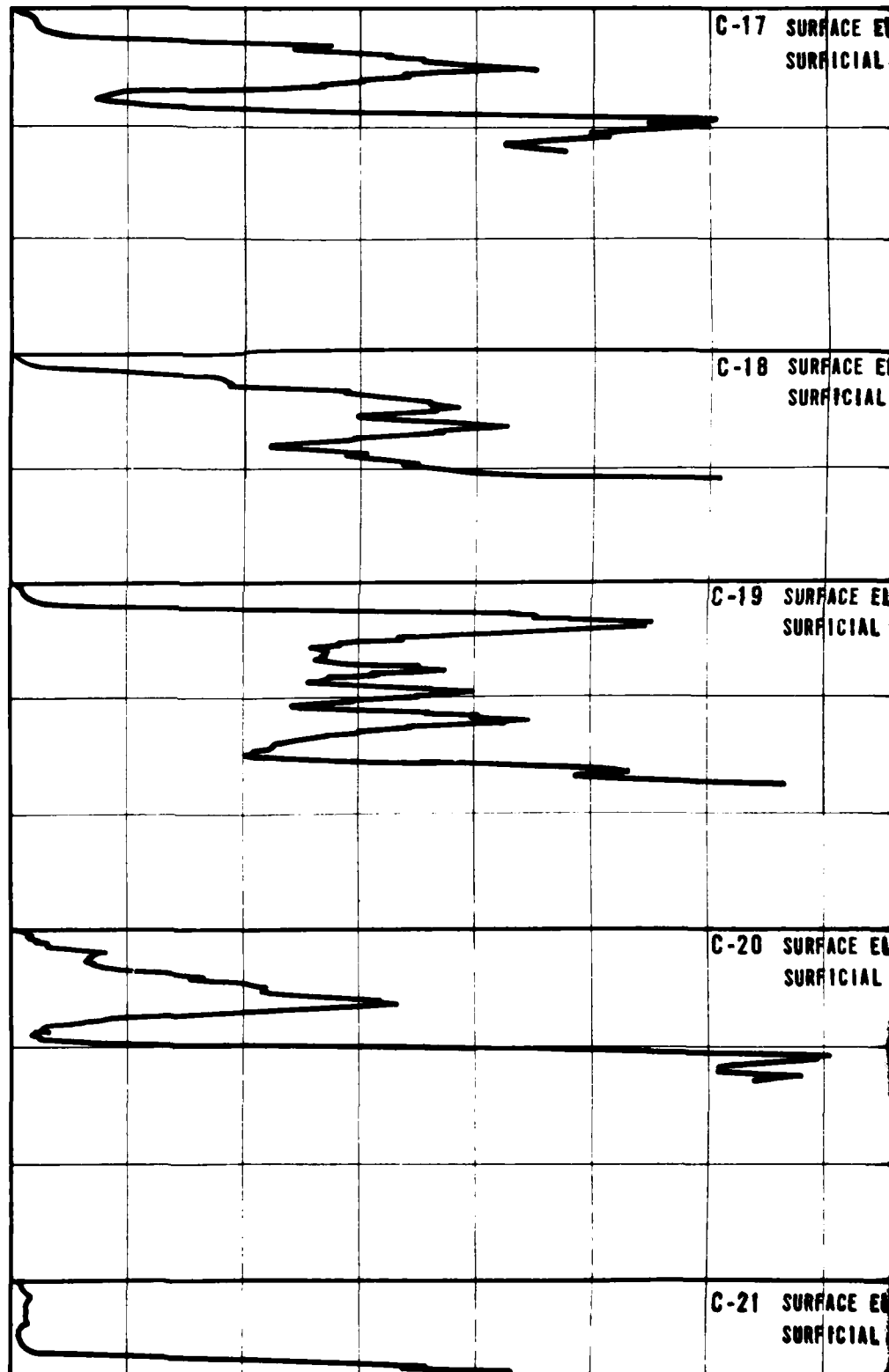
DEPTH

(METERS)
(FEET)

0 0
1 5
2 10
3 15
0 0
1 5
2 10
3 15
0 0
1 5
2 10
3 15
0 0
1 5
2 10
3 15
0 0
1 5
2 10
3 15

CONE RESISTANCE

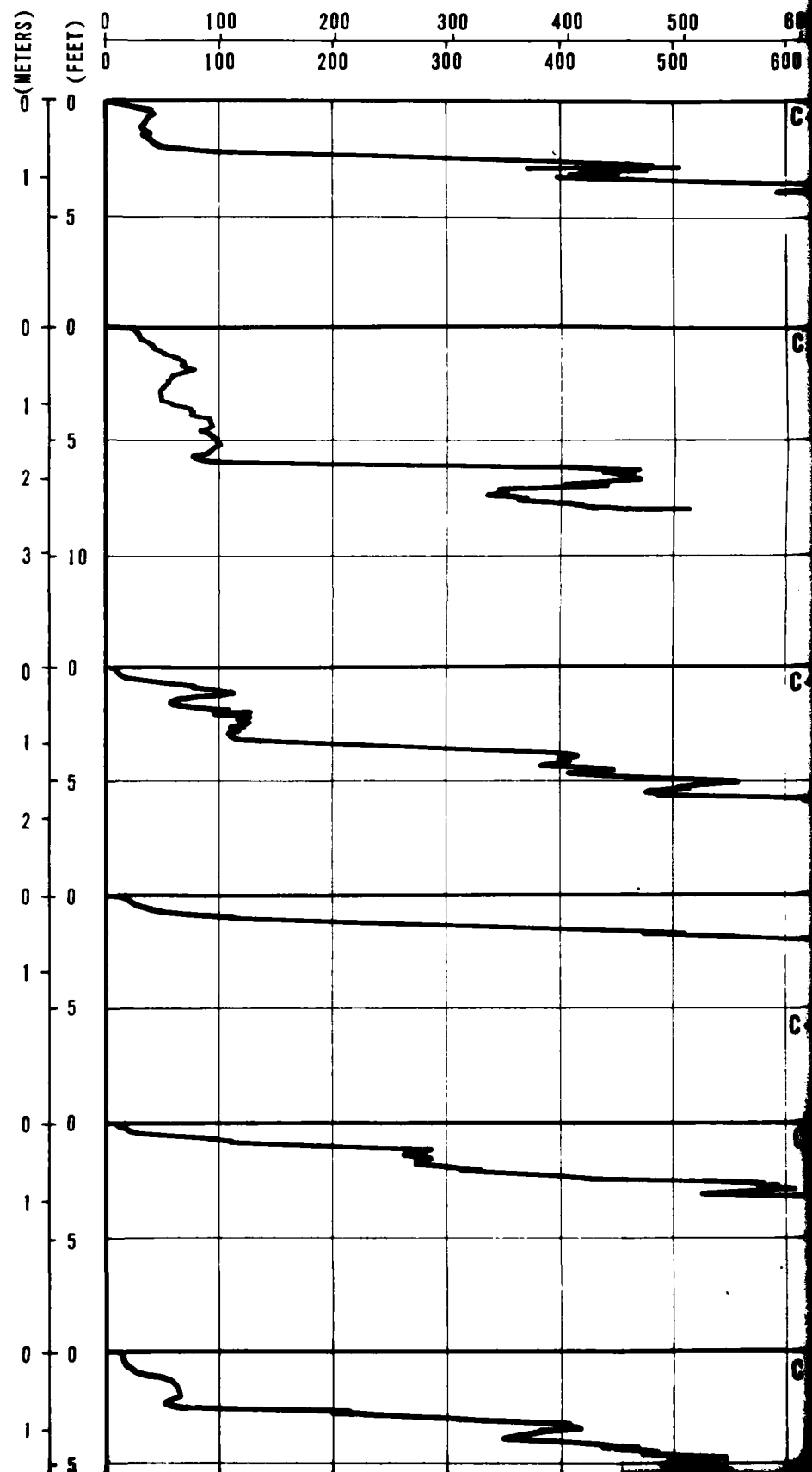
0 100 200 300 400 500 600 700
0 100 200 300 400 500 600 700



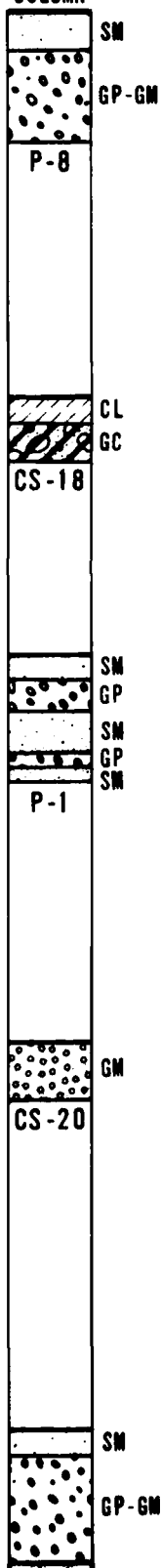
3

CONE RESISTANCE

DEPTH



SOIL COLUMN



800 900 (kg/cm²)
800 900 (tsf)

ELEVATION: 5301' (1616m)		
SOIL GEOLOGIC UNIT: A5i		
ELEVATION: 5007' (1526m)		
SOIL GEOLOGIC UNIT: A5y/A4o		
ELEVATION: 5096' (1553m)		
SOIL GEOLOGIC UNIT: A5y/A4o		
ELEVATION: 5335' (1626m)		
SOIL GEOLOGIC UNIT: A5i		
ELEVATION: 5465' (1668m)		
SOIL GEOLOGIC UNIT: A5i		

3

4

CONE RESISTANCE

200 300 400 500 600 700 800 900 (kg/cm²)
 200 300 400 500 600 700 800 900 (tsf)

C-27 SURFACE ELEVATION: 5145' (1568m)
 SURFICIAL GEOLOGIC UNIT: A5i

C-28 SURFACE ELEVATION: 5086' (1550m)
 SURFICIAL GEOLOGIC UNIT: A5i

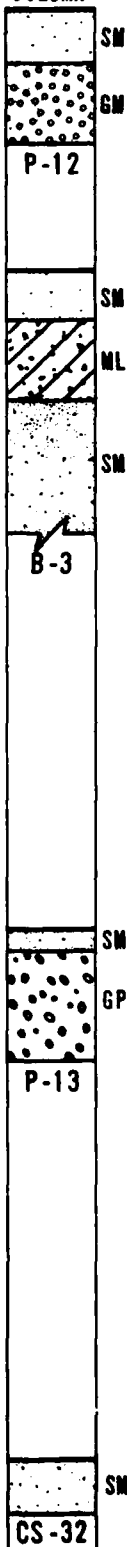
C-29 SURFACE ELEVATION: 5230' (1594m)
 SURFICIAL GEOLOGIC UNIT: A5i

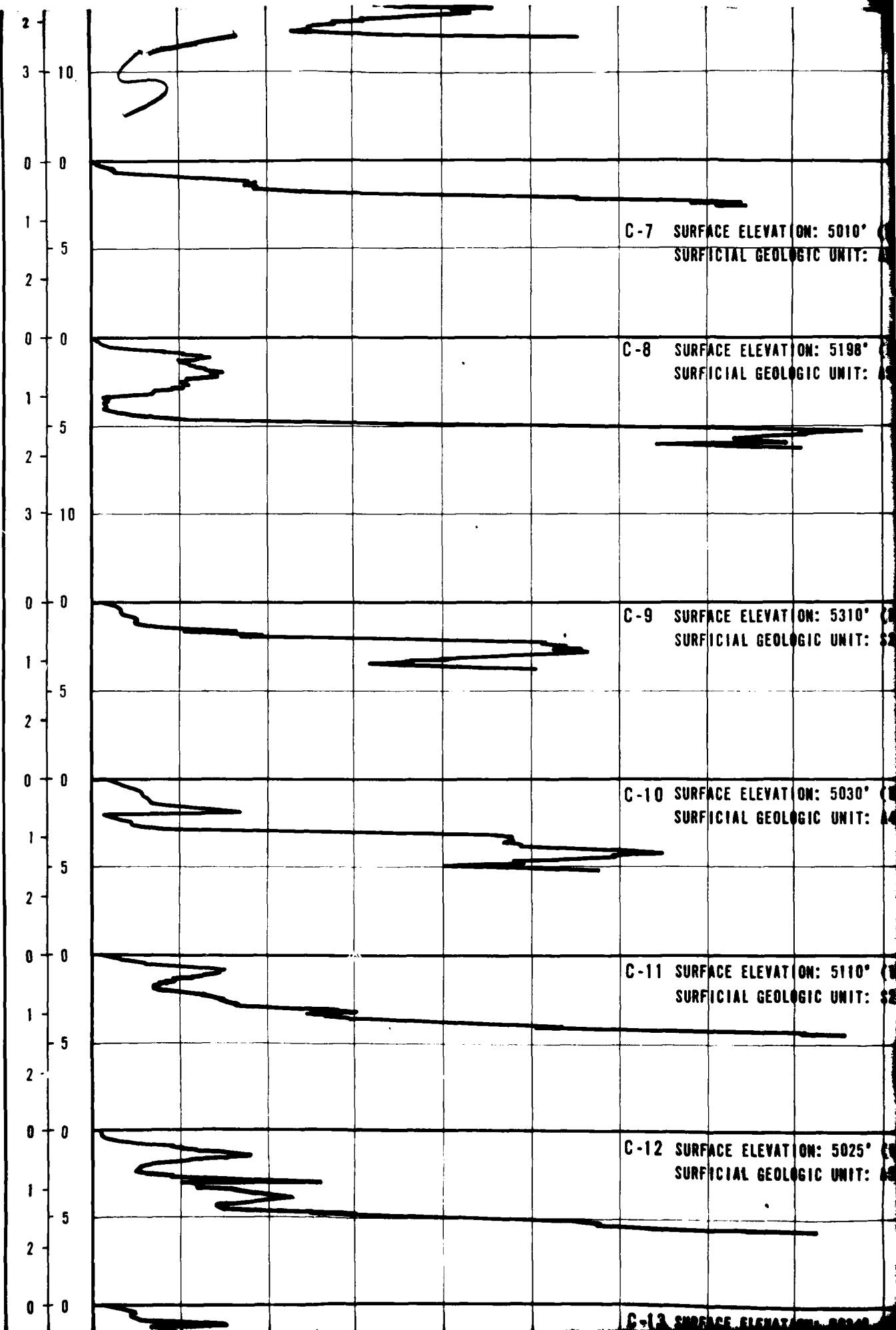
C-30 SURFACE ELEVATION: 5410' (1649m)
 SURFICIAL GEOLOGIC UNIT: A5i

C-31 SURFACE ELEVATION: 5540' (1689m)
 SURFICIAL GEOLOGIC UNIT: A5i

C-32 SURFACE ELEVATION: 5110' (1558m)
 SURFICIAL GEOLOGIC UNIT: A5y/A4o

SOIL COLUMN





1
P (1527m)
T: 45y/A4o

P (1584m)
T: 45i(S2)

P (1618m)
T: S2

P (1533m)
T: A4o

P (1558m)
T: S2

P (1532m)
T: 45y/A4o

(1534m)

SM
P-4

SM
GP
P-5

SM
GP
CS-9

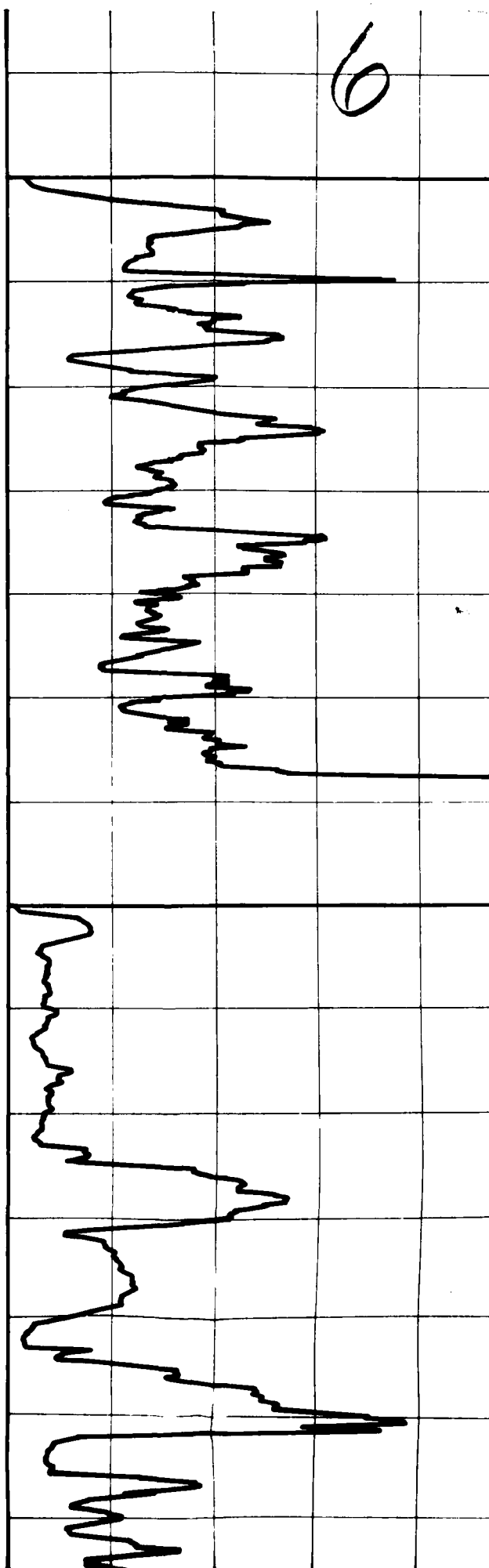
CL-ML
SP
T-2 &
B-2

SM
CS-11

SM
GP-GM
P-6

SM

6
3 10
0 0
1 5
2 5
3 10
4 15
5 15
6 20
7 25
8 25
9 30
0 0
1 5
2 5
3 10
4 15
5 15
6 20
7 25
8 25
9 30



C-22 SURFACE EL
SURFICIAL

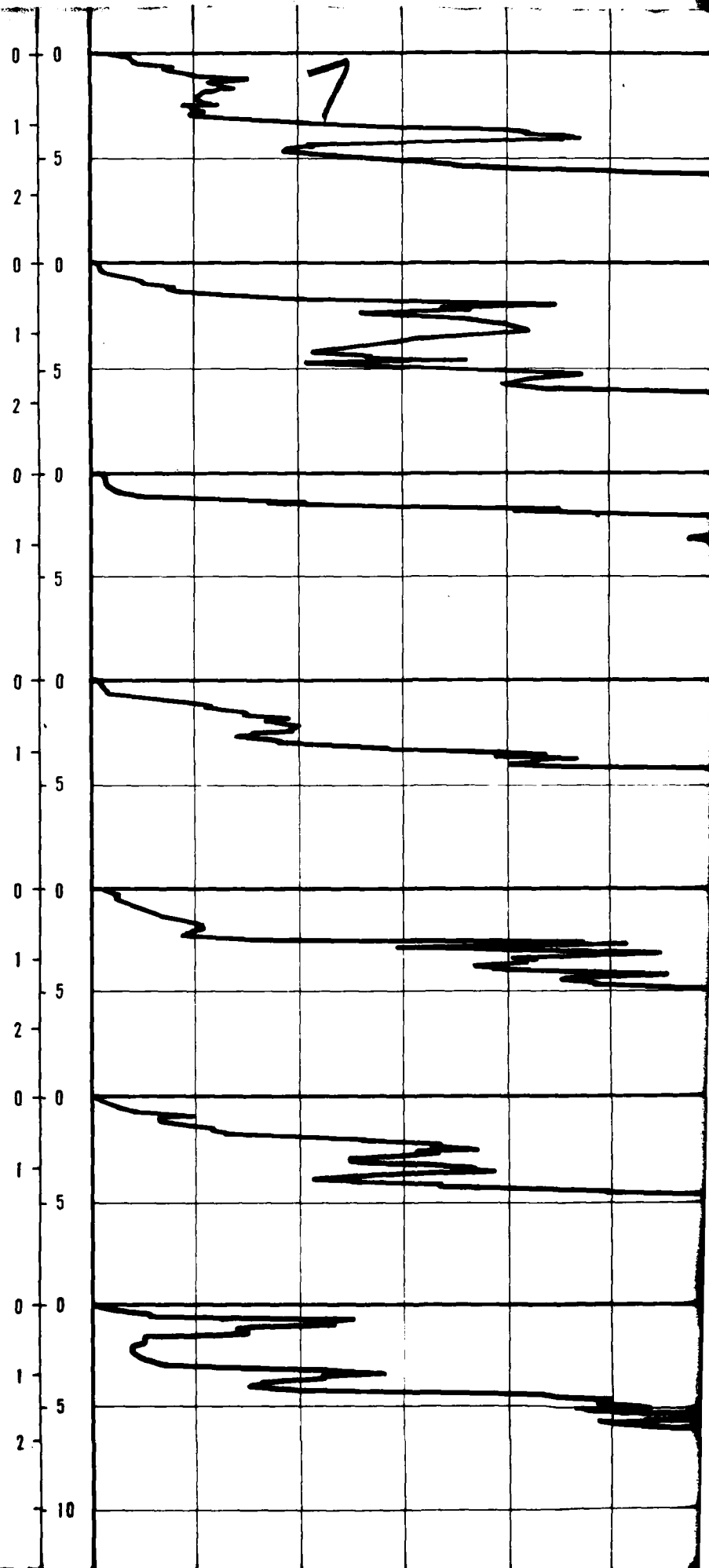
C-23 SURFACE EL
SURFICIAL

1
E ELEVATION: 5024' (1531m)
IAL GEOLOGIC UNIT: A5y/A4o

SM
SC
CL
P-10

E ELEVATION: 5025' (1532m)
IAL GEOLOGIC UNIT: A4o

SM
CL
CS-23



C-33 SURFACE ELEVATION: 5160' (1573m)
SURFICIAL GEOLOGIC UNIT: A5i

C-34 SURFACE ELEVATION: 5285' (1611m)
SURFICIAL GEOLOGIC UNIT: A5i

C-35 SURFACE ELEVATION: 5405' (1647m)
SURFICIAL GEOLOGIC UNIT: A5i

C-36 SURFACE ELEVATION: 5600' (1707m)
SURFICIAL GEOLOGIC UNIT: A5i

C-37 SURFACE ELEVATION: 5069' (1545m)
SURFICIAL GEOLOGIC UNIT: A5y, A4o

C-38 SURFACE ELEVATION: 5170' (1576m)
SURFICIAL GEOLOGIC UNIT: A5i

C-39 SURFACE ELEVATION: 5248' (1600m)
SURFICIAL GEOLOGIC UNIT: A5i

SM

GP-GM

P-15

SM

GP-GM

P-16

SM

GP-GM

P-14

GP-GM

CS-39

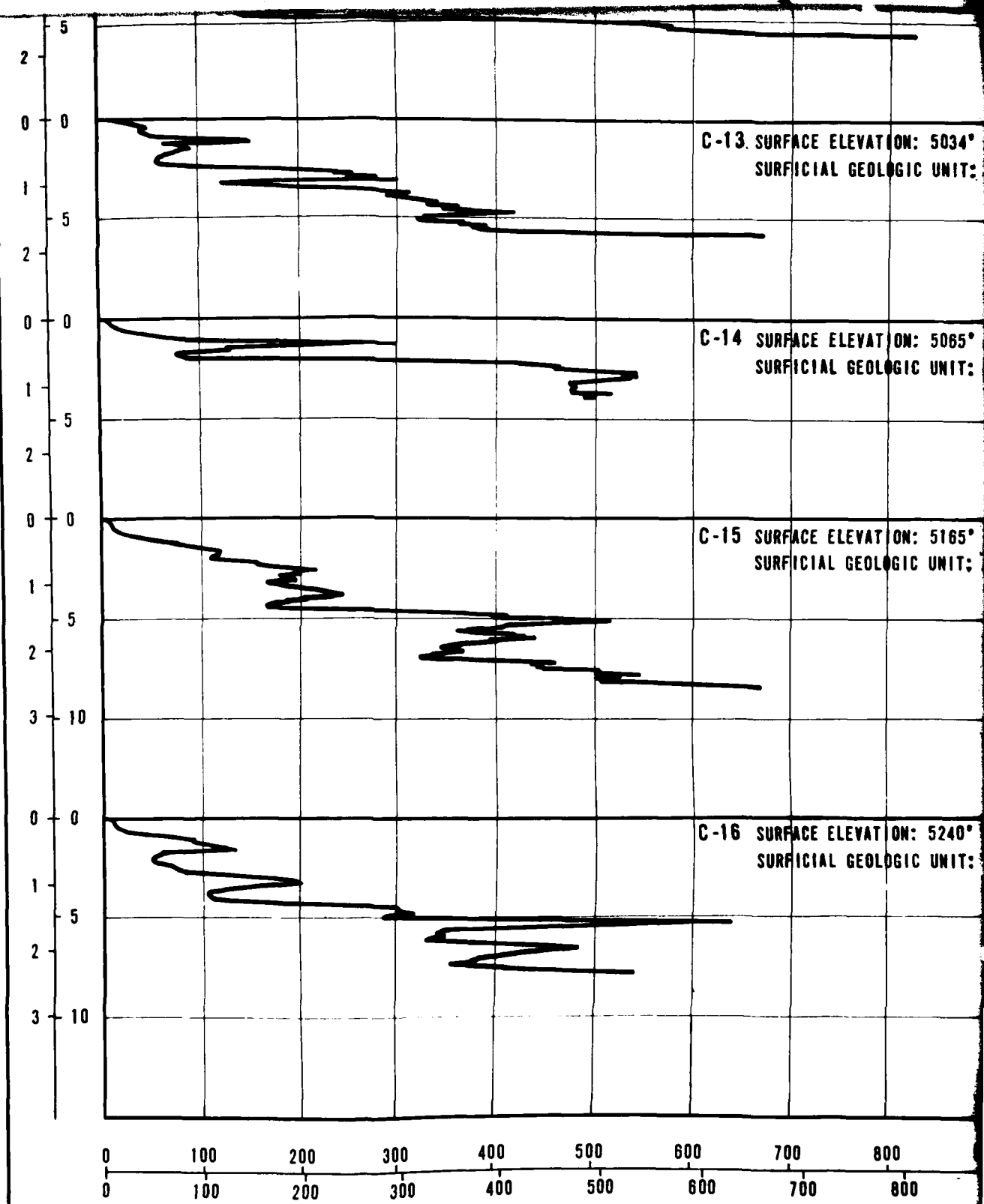
SP-SM

SM

P-18

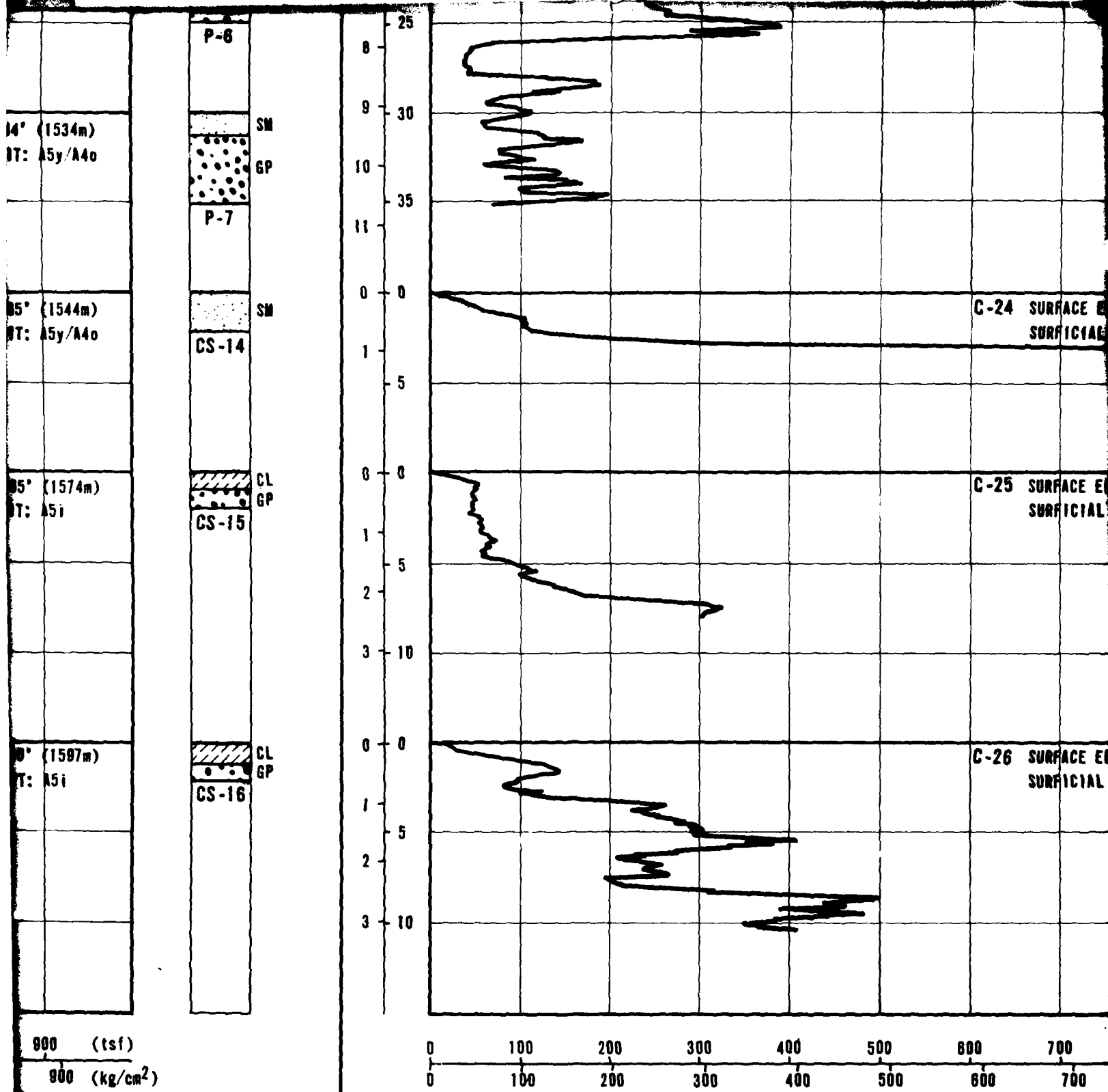
8

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9



ELEVATION: 5028' (1533m)
 AL GEOLOGIC UNIT: A4o

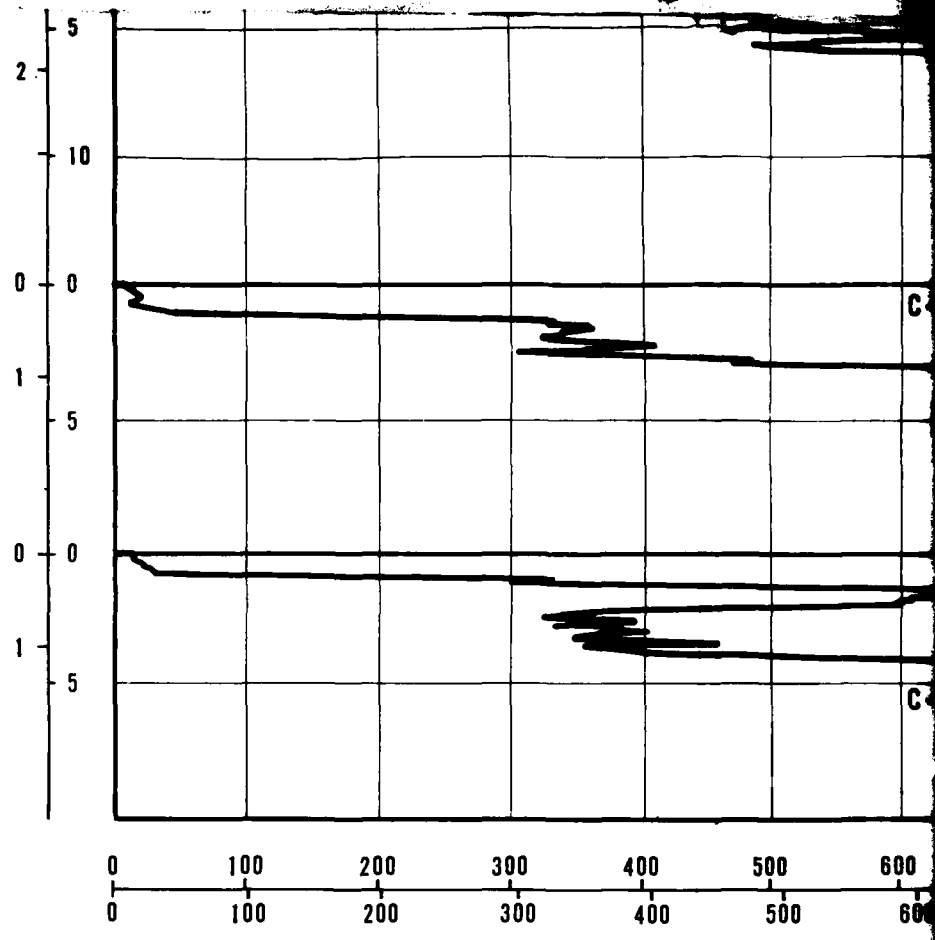
ELEVATION: 5053' (1540m)
 AL GEOLOGIC UNIT: A5y/A4o

ELEVATION: 5125' (1562m)
 AL GEOLOGIC UNIT: A5i

CL
 CS-24

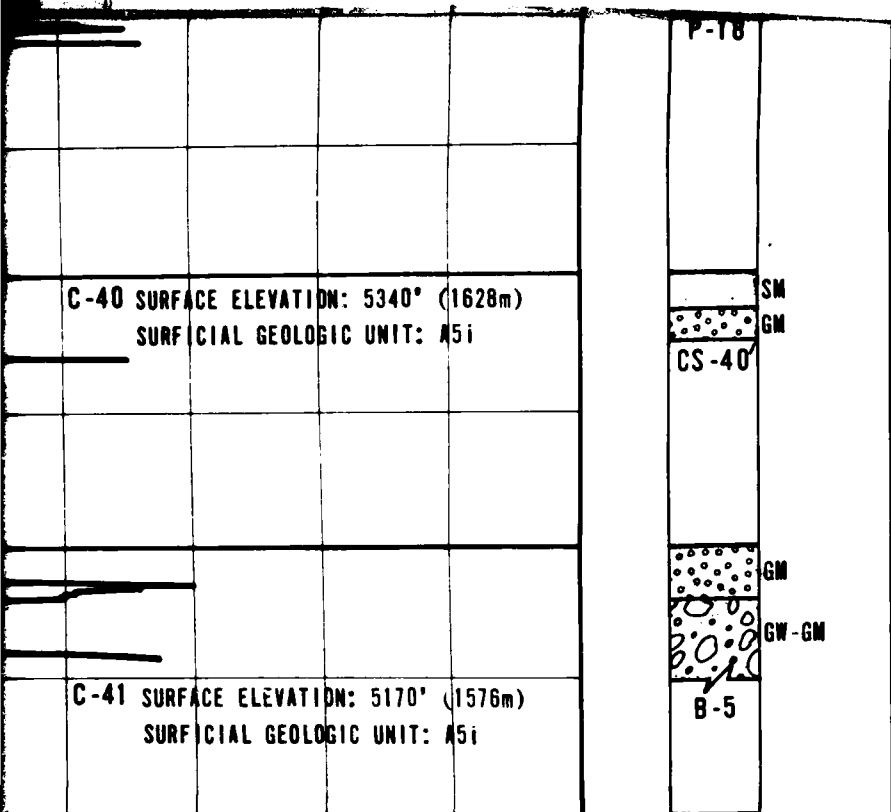
CL
 P-11

GM
 CS-26



800 900 (tsf)
 800 900 (kg/cm²)

DE



600 700 800 900 (tsf)
 600 700 800 900 (kg/cm²)

CONE PENETROMETER TEST RESULTS
VERIFICATION SITE
SNAKE EAST CDP. UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

DRAWING

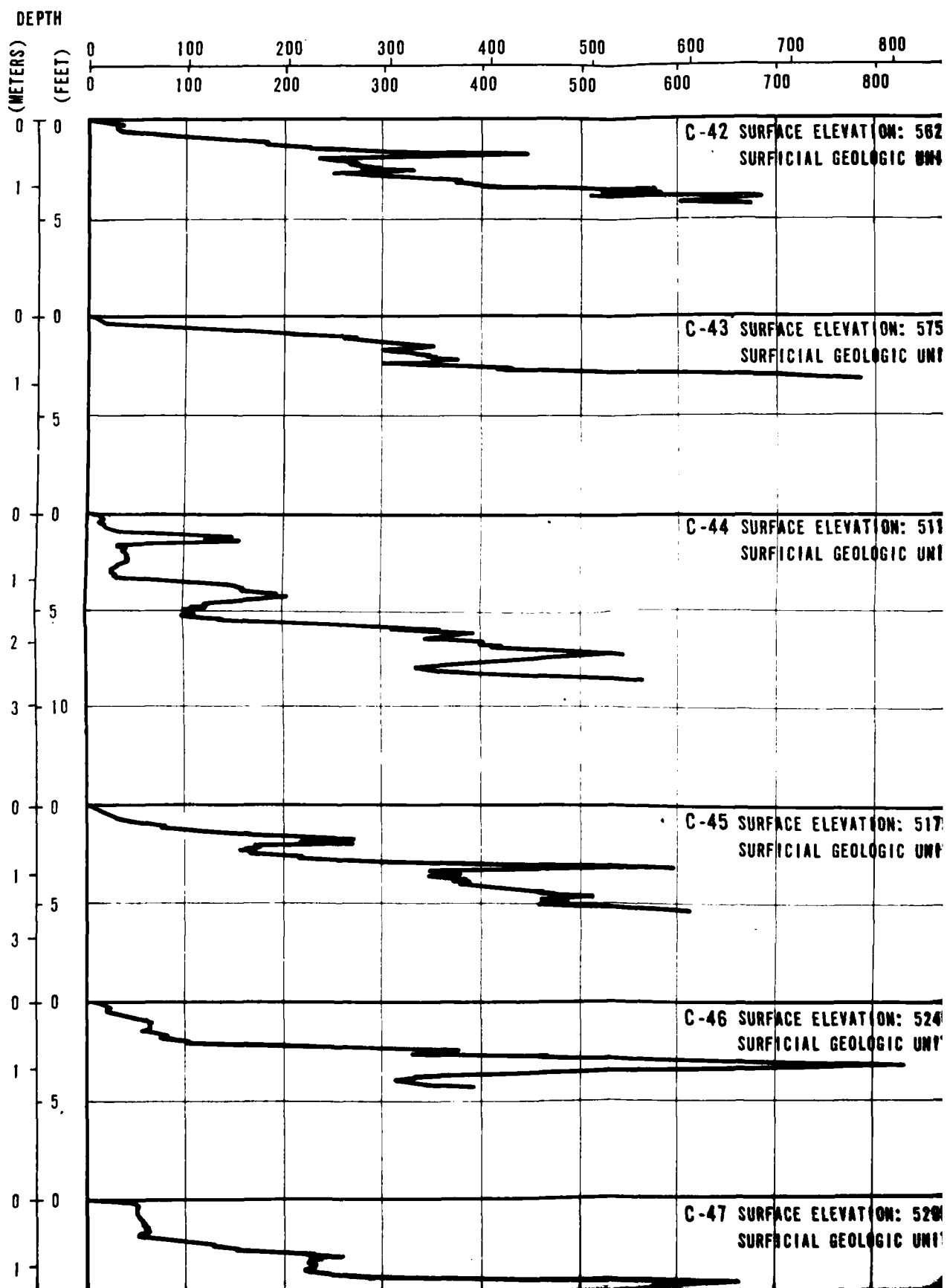
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1 OF 2

FUGRO NATIONAL, INC.

12

CONE RESISTANCE

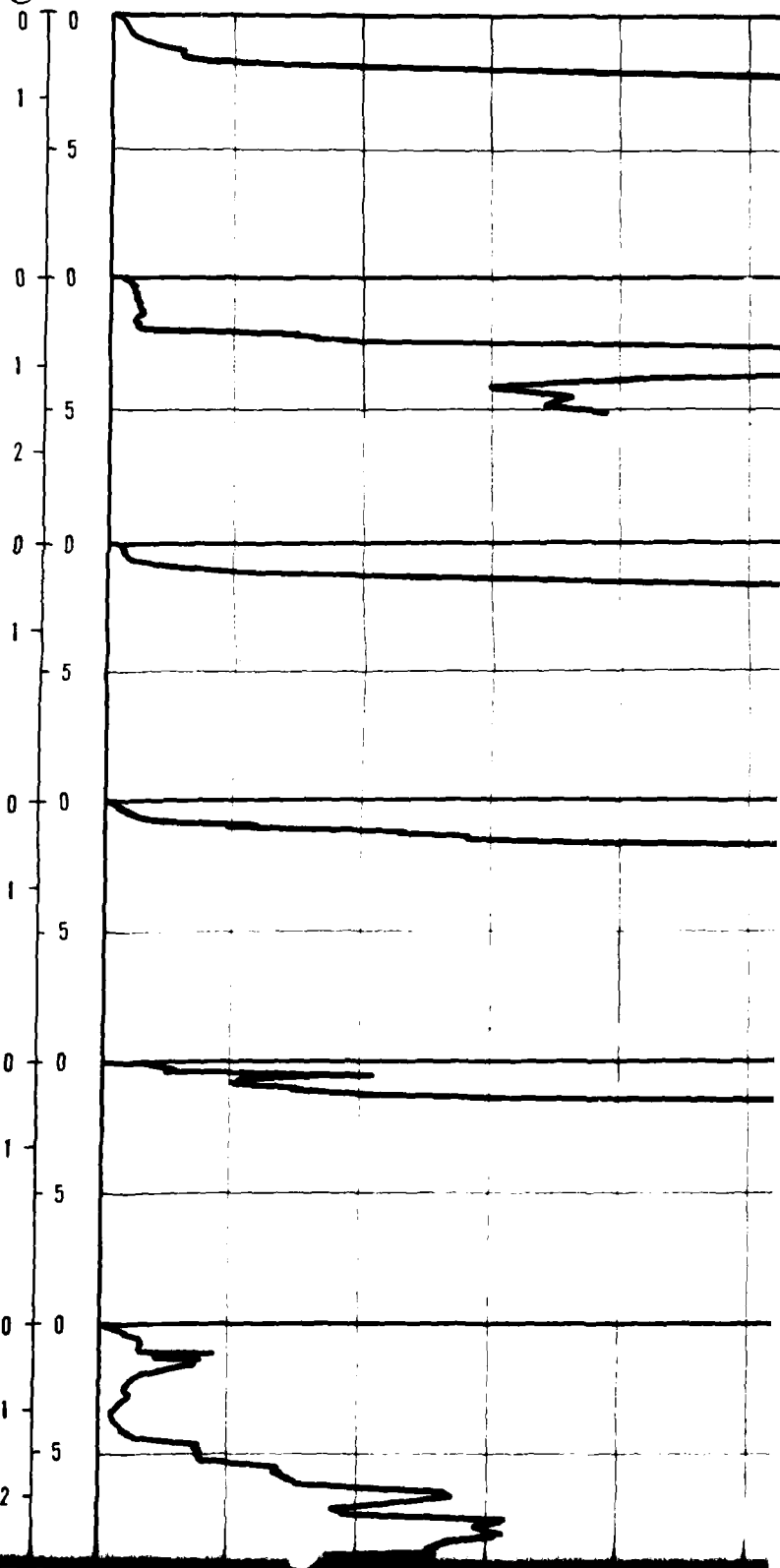


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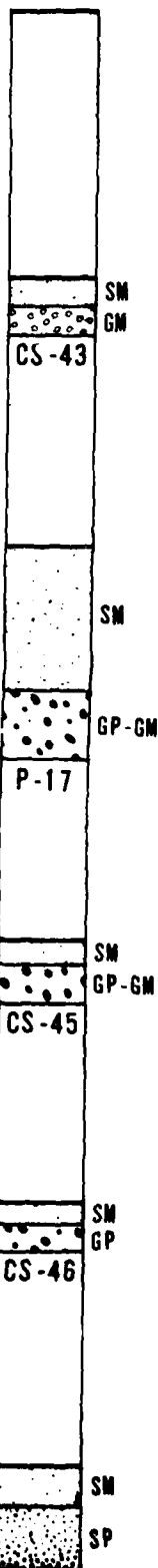
CONE RESIS

DEPTH

0 100 200 300 400 500
0 100 200 300 400 500



SOIL COLUMN



700 800 900 (kg/cm²)
700 800 900 (tsf)

SURFACE ELEVATION: 5625' (1714m)		
SURFICIAL GEOLOGIC UNIT: A5i		
SURFACE ELEVATION: 5754' (1754m)		
SURFICIAL GEOLOGIC UNIT: ROCK		
SURFACE ELEVATION: 5114' (1559m)		
SURFICIAL GEOLOGIC UNIT: A5i		
SURFACE ELEVATION: 5175' (1577m)		
SURFICIAL GEOLOGIC UNIT: A5i		
SURFACE ELEVATION: 5240' (1597m)		
SURFICIAL GEOLOGIC UNIT: A5i		
SURFACE ELEVATION: 5295' (1614m)		
SURFICIAL GEOLOGIC UNIT: A5i		

AD-A113 325

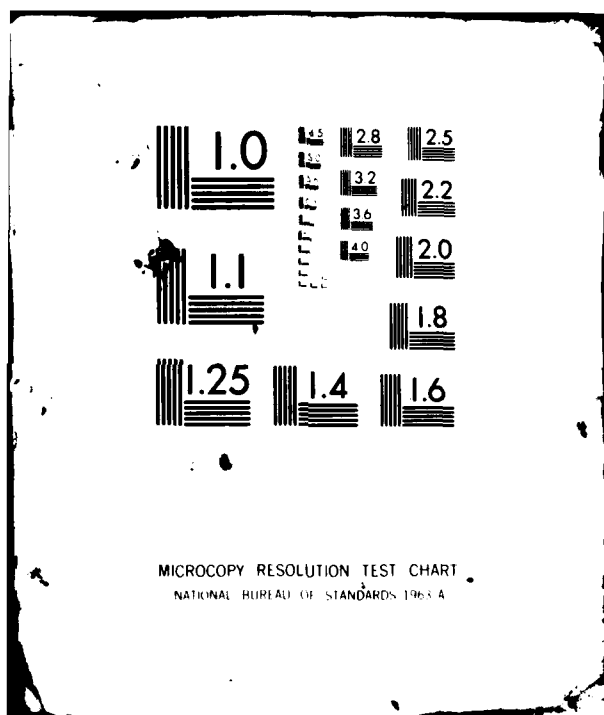
FUGRO NATIONAL INC LONG BEACH CA F/G 8/13
MX SITING INVESTIGATION. GEOTECHNICAL EVALUATION. VOLUME III. N--ETC(U)
AUG 79 F04704-80-C-0006
FN-TR-27-VOL-3 NL

UNCLASSIFIED

3 13



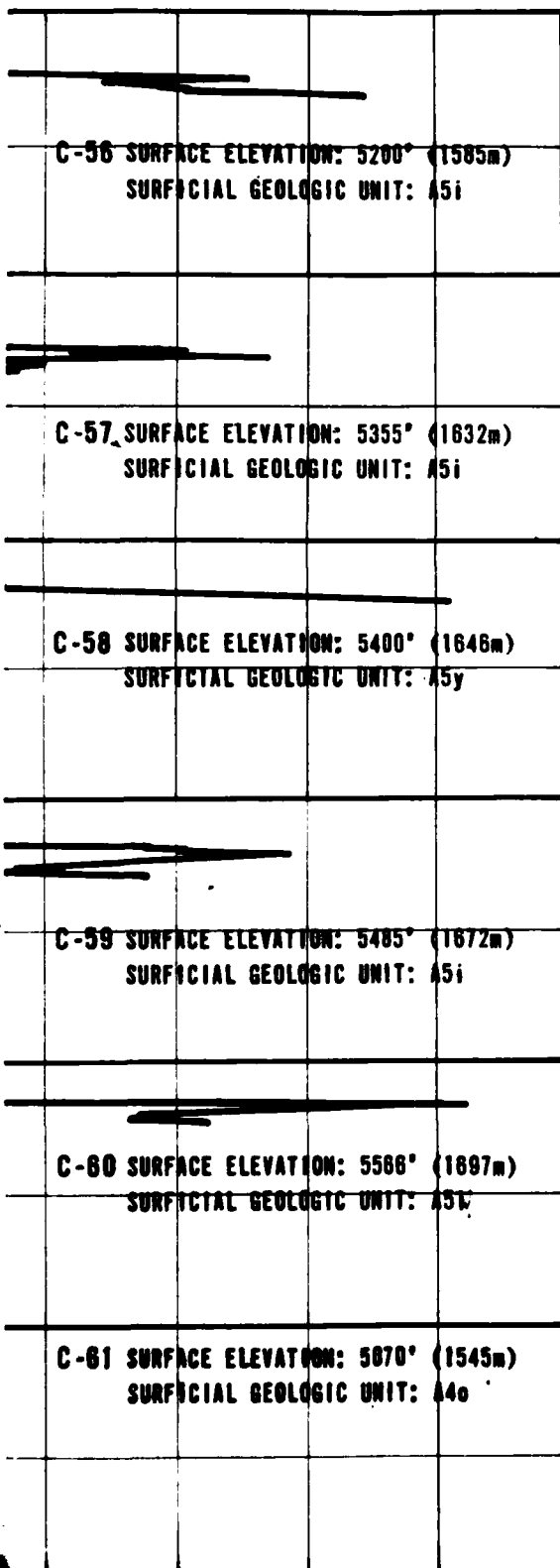
END
DATE
FILMED
5 82
DTIC



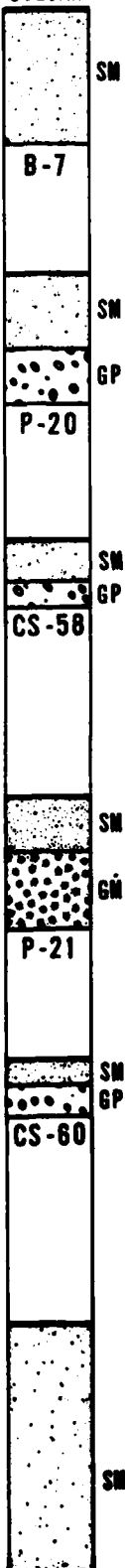
3

CE

600 700 800 900 (kg/cm²)
600 700 800 900 (tsf)

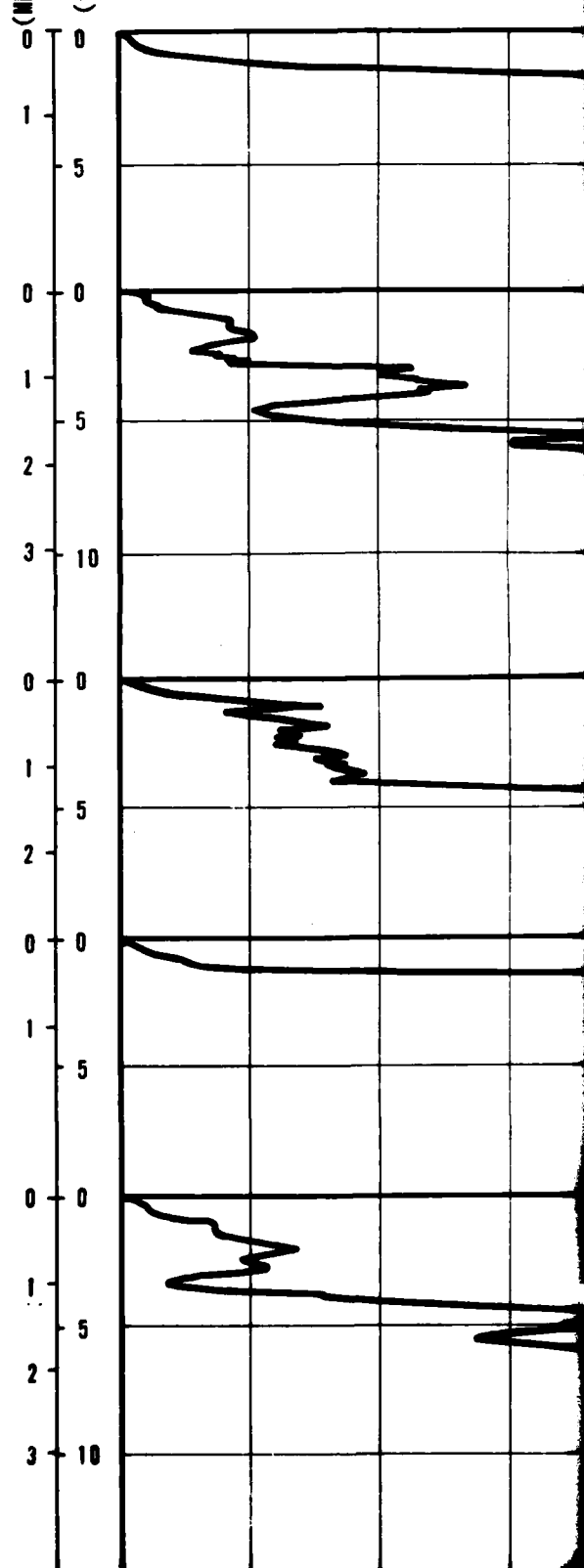


SOIL COLUMN



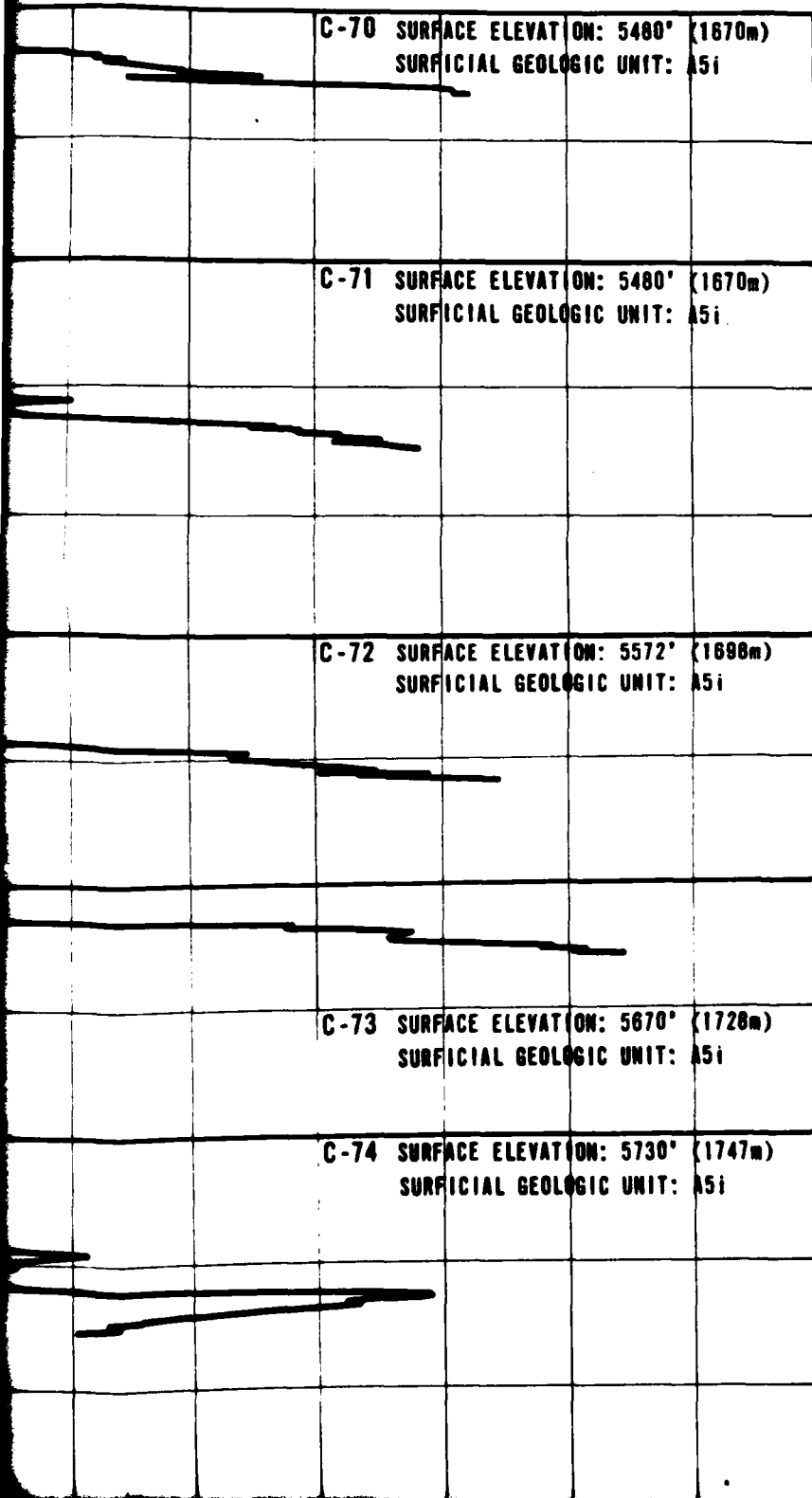
DEPTH

0 100 200 300
0 100 200 300

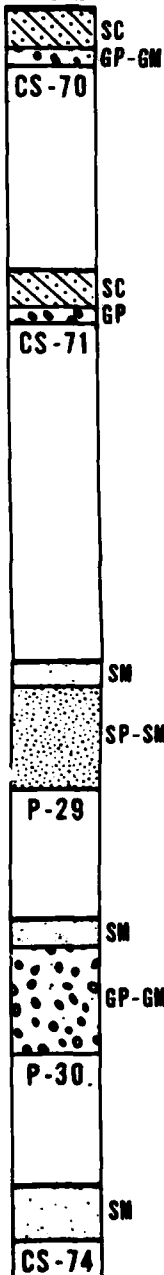


CONE RESISTANCE

400 500 600 700 800 900 (kg/cm²)
 400 500 600 700 800 900 (tsf)

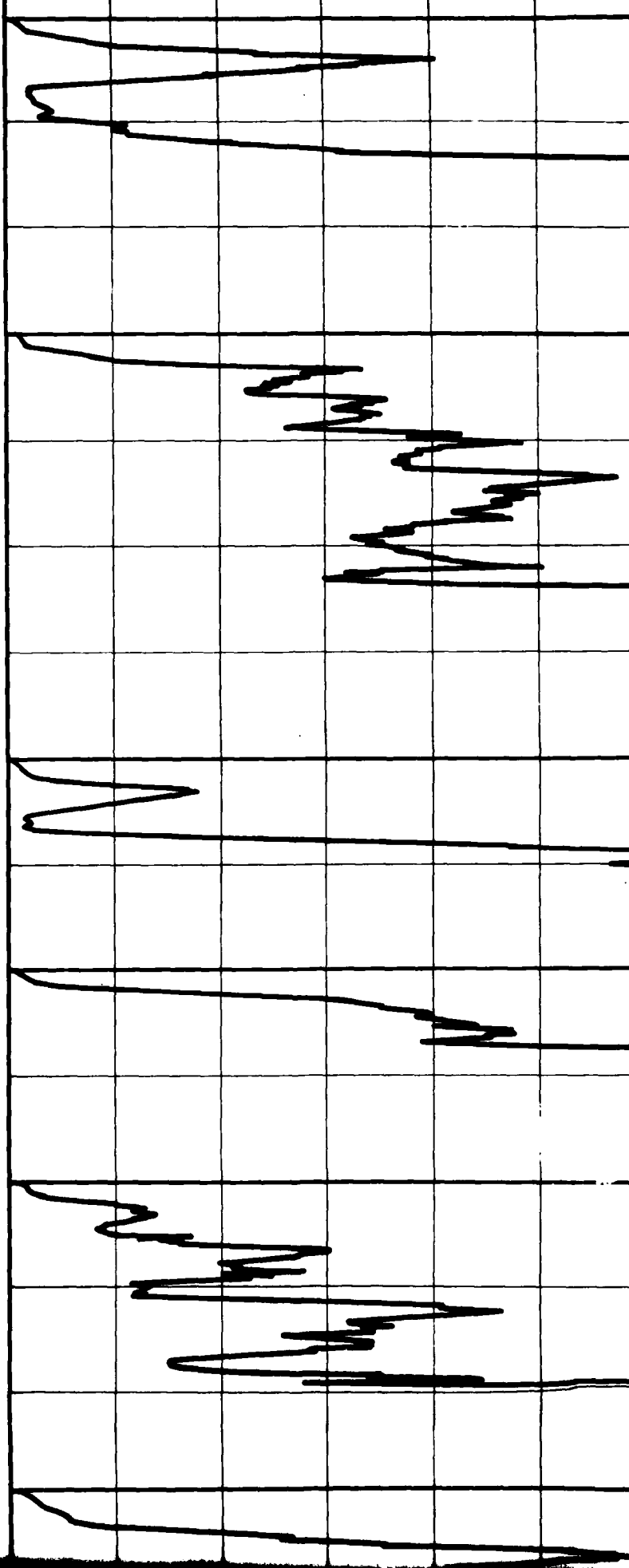


SOIL COLUMN



5

0 0
1 5
2
3 10
0 0
1 5
2
3 10
4 15
0 0
1 5
2
0 0
1 5
0 0
1 5
0 0
1 5
2
3 10
0 0



C-48 SURFACE ELEVATION: 5535'
SURFICIAL GEOLOGIC UNITS

C-49 SURFACE ELEVATION: 5600'
SURFICIAL GEOLOGIC UNITS

C-50 SURFACE ELEVATION: 5425'
SURFICIAL GEOLOGIC UNITS

C-51 SURFACE ELEVATION: 5300'
SURFICIAL GEOLOGIC UNITS

C-52 SURFACE ELEVATION: 5300'
SURFICIAL GEOLOGIC UNITS

C-53 SURFACE ELEVATION: 5200'
SURFICIAL GEOLOGIC UNITS

FACE ELEVATION: 5535' (1687m)
 OFFICIAL GEOLOGIC UNIT: A5i

SM
 GP
 CS-48

FACE ELEVATION: 5600' (1707m)
 OFFICIAL GEOLOGIC UNIT: A5i

SM
 GN
 P-23

FACE ELEVATION: 5425' (1654m)
 OFFICIAL GEOLOGIC UNIT: A5i

SM
 GN
 P-22

FACE ELEVATION: 5380' (1640m)
 OFFICIAL GEOLOGIC UNIT: A5i

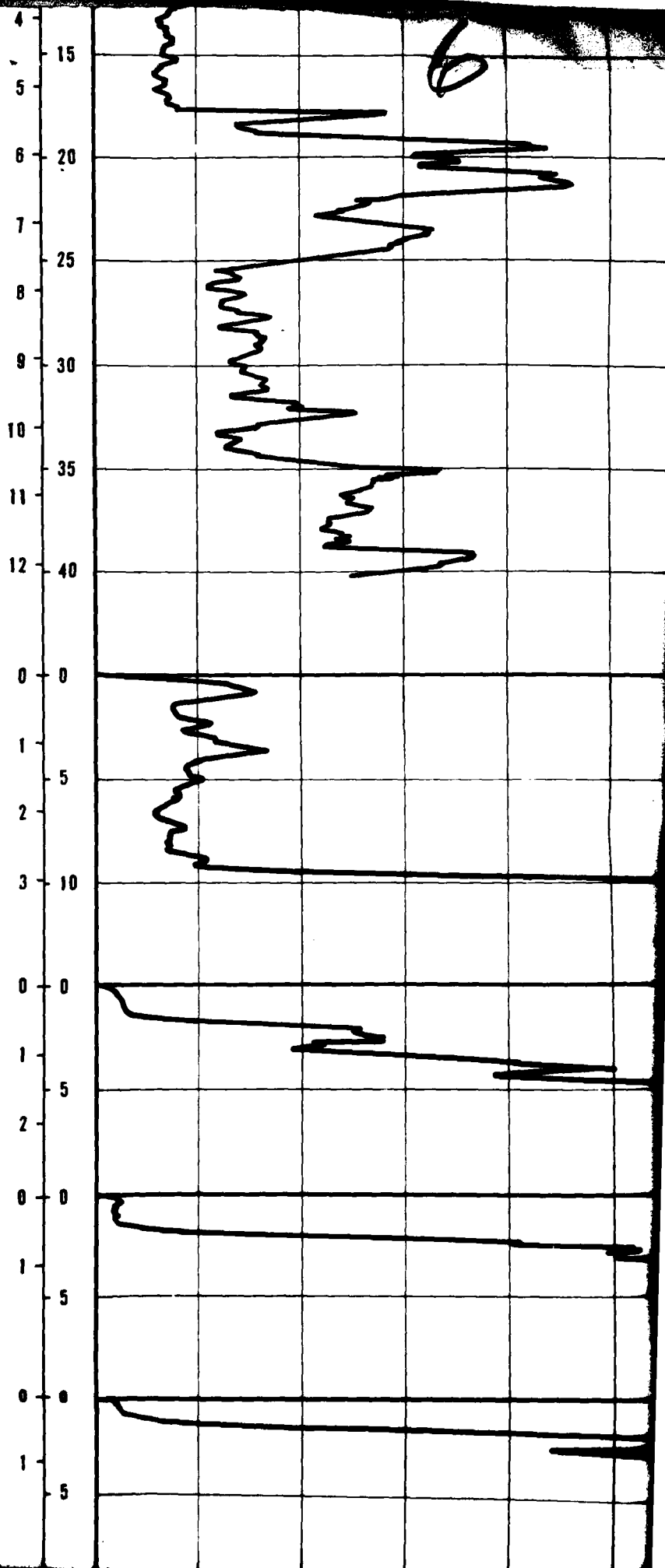
SM
 CS-51

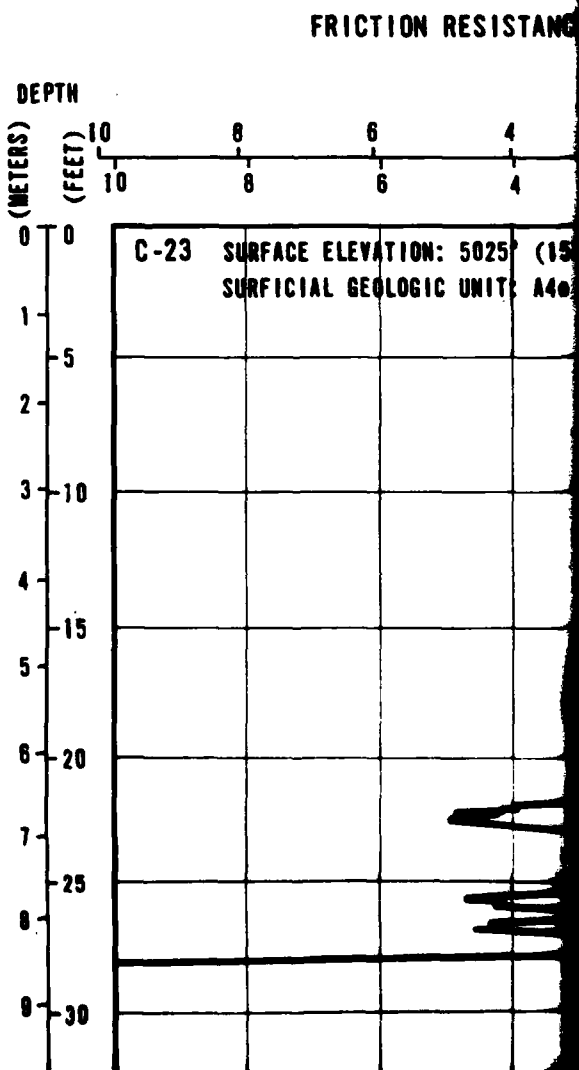
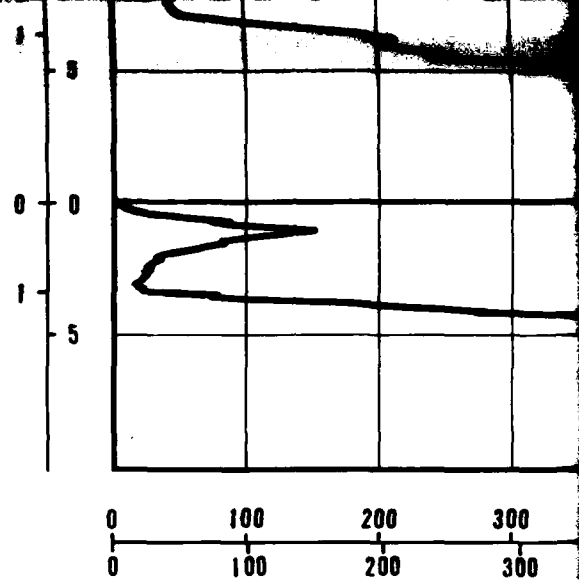
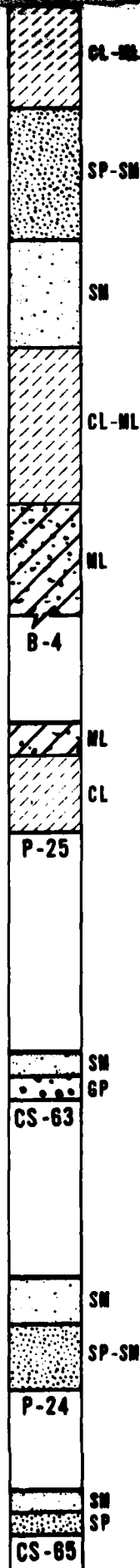
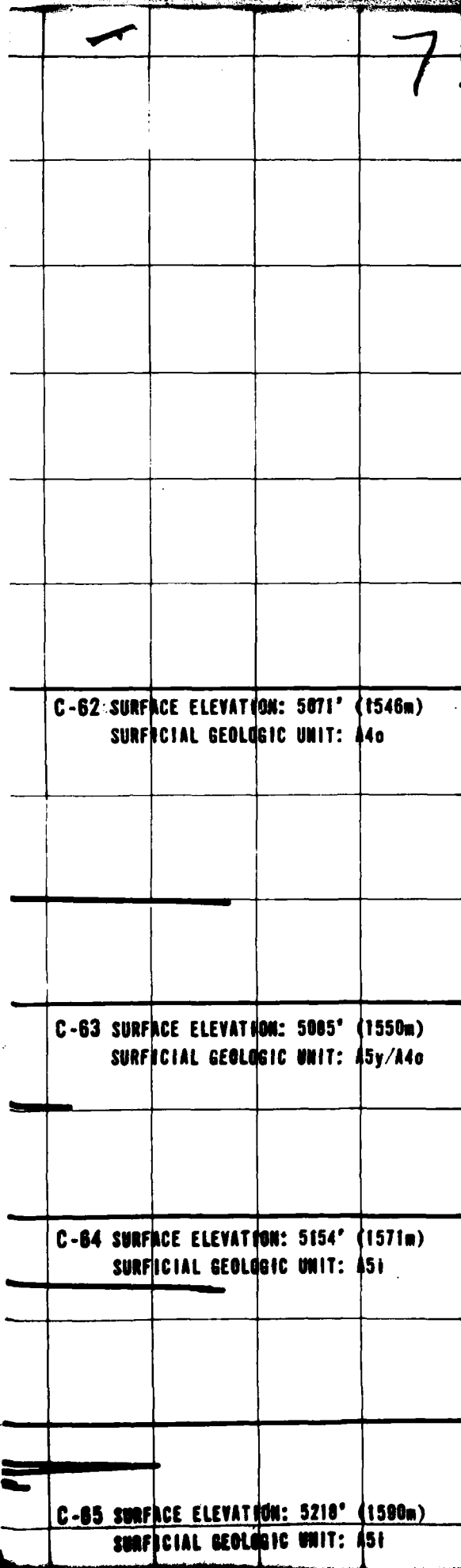
FACE ELEVATION: 5375' (1638m)
 OFFICIAL GEOLOGIC UNIT: A5y

GN
 SM
 B-6

FACE ELEVATION: 5330' (1625m)
 OFFICIAL GEOLOGIC UNIT: A5i

SM
 SP
 CS-53





SURFACE GEOL. UNIT

C-76 SURFACE ELEVATION: 5845' (1721m)
SURFICIAL GEOLOGIC UNIT: A5i

P-28

GM

CS-76

400 500 600 700 800 900 (tsf)
400 500 600 700 800 900 (kg/cm²)

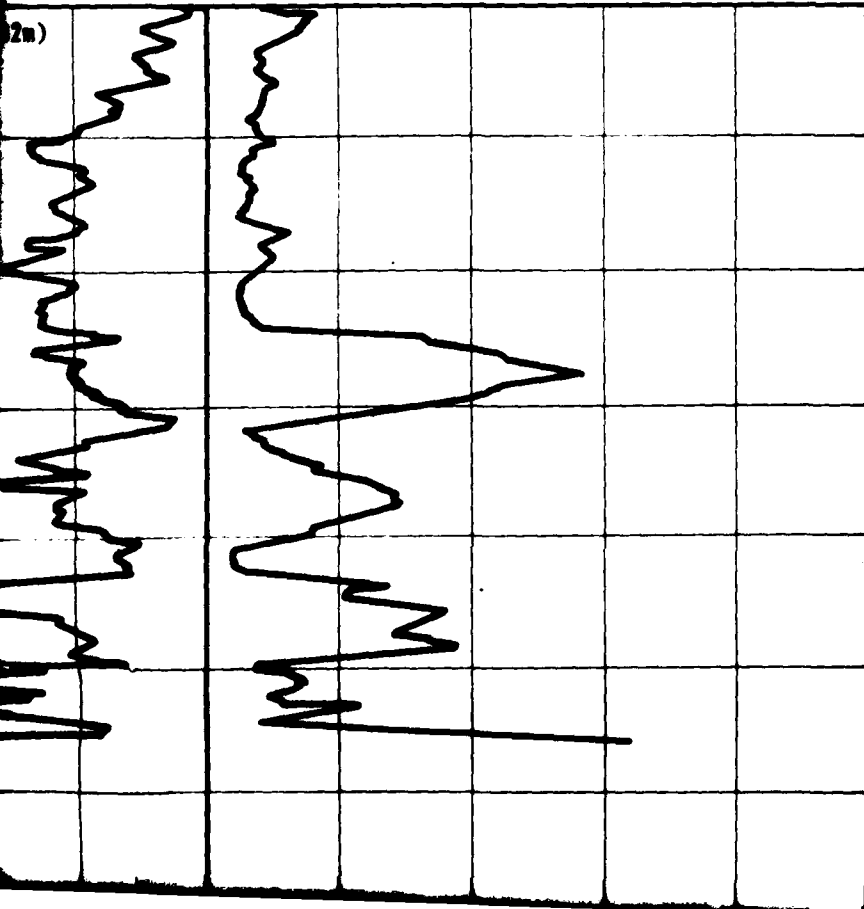
CONE RESISTANCE

2 0 100 200 300 400 (kg/cm²)
2 0 100 200 300 400 (tsf)

SOIL
COLUMN

SM
CL

CS-23



APPROVED BY _____

C-55 SURFACE ELEVATION: 5175
SURFICIAL GEOLOGIC UNIT:

2 JUL 79

9

ELEVATION: 5375' (1638m)
LOCAL GEOLOGIC UNIT: 45y

ELEVATION: 5330' (1625m)
GEOLOGIC UNIT: A5i

FACE ELEVATION: 5220' (1591m)
SOCIAL GEOLOGIC UNIT: ASi

FACE ELEVATION: 5175' (1577m)
SOCIAL GEOLOGIC UNIT: 440

SM

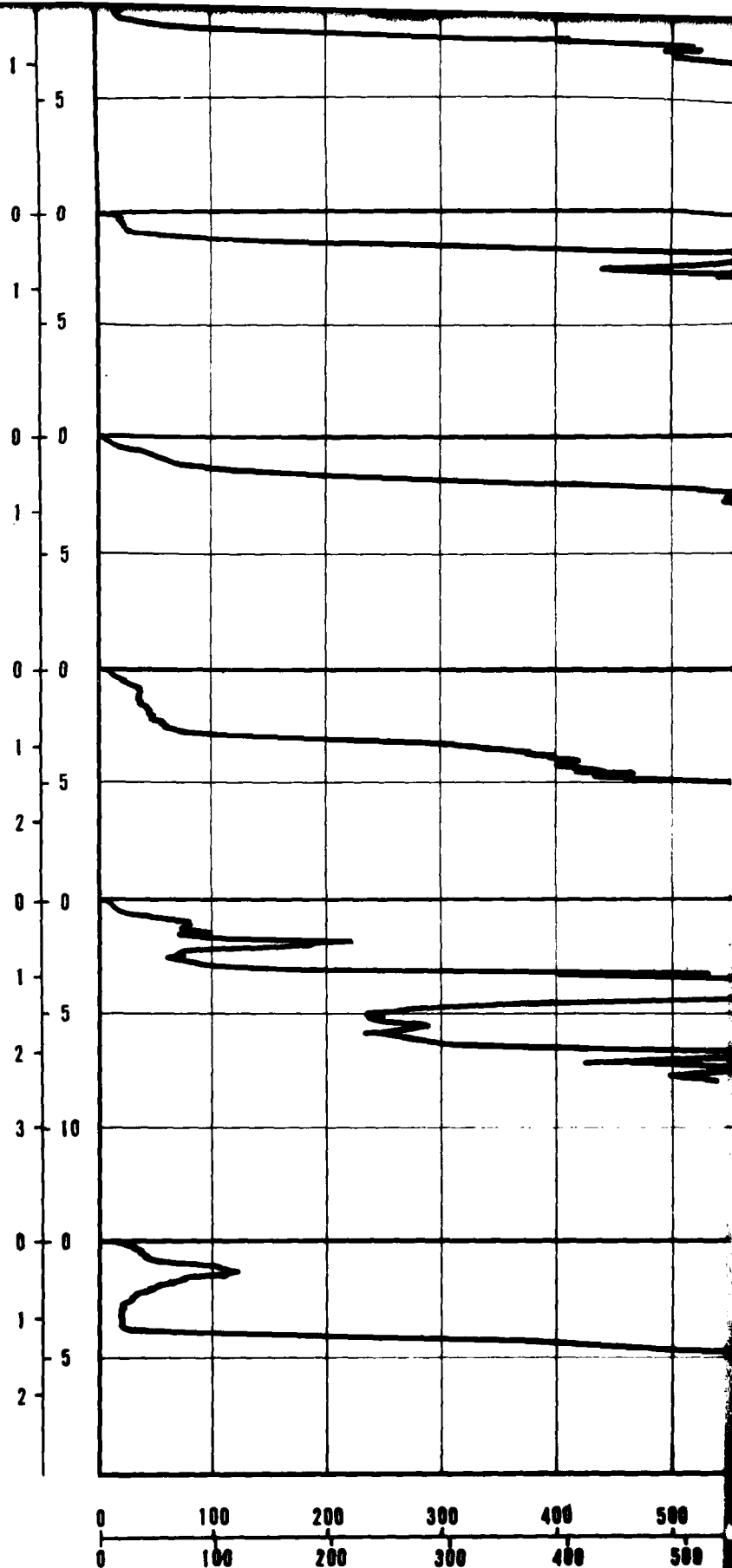
B-6

SN
SP

CS-53

SM

P-19



10

C-64 SURFACE ELEVATION: 5184' (1571m)
SURFICIAL GEOLOGIC UNIT: A5i

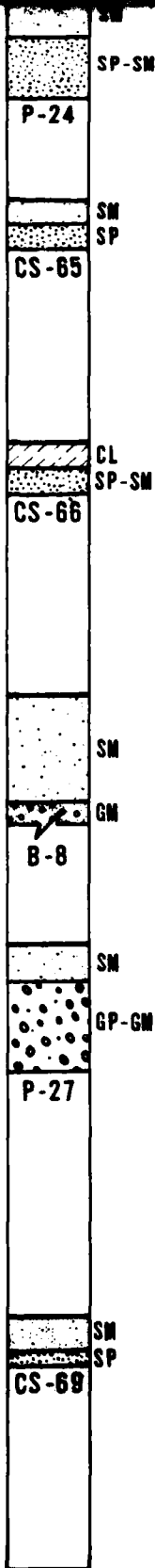
C-65 SURFACE ELEVATION: 5218' (1590m)
SURFICIAL GEOLOGIC UNIT: A5i

C-66 SURFACE ELEVATION: 5129' (1563m)
SURFICIAL GEOLOGIC UNIT: A5y

C-67 SURFACE ELEVATION: 5202' (1586m)
SURFICIAL GEOLOGIC UNIT: A5y

C-68 SURFACE ELEVATION: 5280' (1609m)
SURFICIAL GEOLOGIC UNIT: A5y

C-69 SURFACE ELEVATION: 5386' (1638m)
SURFICIAL GEOLOGIC UNIT: A5y

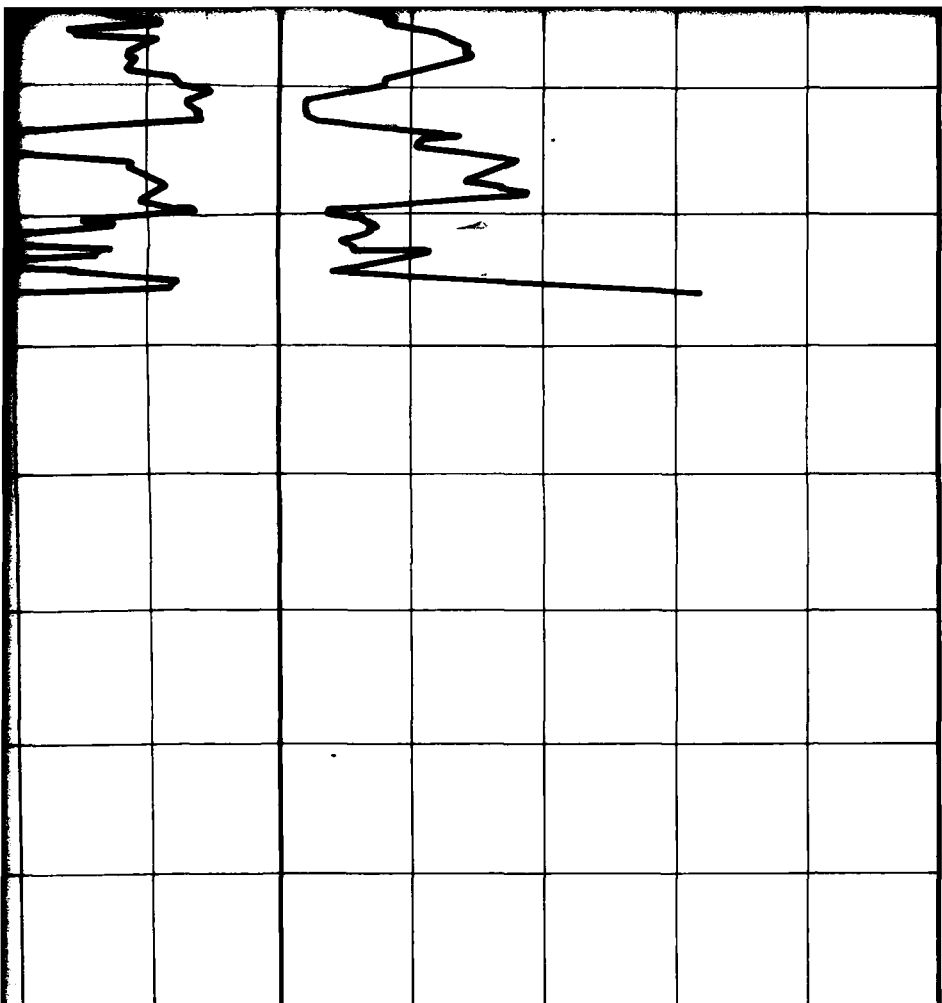


5
6 20
7
8 25
9 30

10 8 6 4
10 8 6 4

600 700 800 900 (tsf)
600 700 800 900 (kg/cm²)

11



4 2 0 100 200 300 400 (tsf)
4 2 0 100 200 300 400 (kg/cm²)

CONE PENETROMETER TEST RESULTS
VERIFICATION SITE
SNAKE EAST CDP. UTAH

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

DRAWING
2
2 OF 2

FUGRO NATIONAL, INC.

12

END

DATE
FILMED

5 - 82

DTIC